SWORDS INTO STILETTOS:

THE BATTLE BETWEEN HEDGERS AND TRANSFORMERS
FOR THE SOUL OF DOD

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CONTENTS

Glossary

ACTD	Advanced Concept Technology Demonstration
AFA	Air Force Association
AEF	Aerospace expeditionary force
ARG	Amphibious Ready Group
BUR	Bottom-Up Review
C4ISR	Command, control, communications, computers, intelligence, surveillance, reconnaissance
CINC	commander-in-chief
CJCS	Chairman of the Joint Chiefs of Staff
CVBG	Carrier Battle Group
DCI	Defense Capabilities Initiative (NATO)
DoD	Department of Defense
GPS	Global Positioning System
GWAPS	*Gulf War Air Power Survey*
JROC	Joint Requirements Oversight Council
JSTARS	Joint Surveillance Target Attack Radar System
JTF	Joint Task Force
JV 2010	*Joint Vision 2010*
MEU	Marine Expeditionary Unit
MRC	Major regional contingency
MTR	Military-technical revolution
MTW	Major theater war
NATO	North Atlantic Treaty Organization
NDP	National Defense Panel
OODA	Observation-orientation-decision-action
OPTEMPO	Operations tempo
OSD	Office of the Secretary of Defense
PGM	Precision-guided munition
PPBS	Planning, Programming, and Budgeting System
QDR	Quadrennial Defense Review
R&D	Research and development
RMA	Revolution in military affairs
SecDef	Secretary of Defense
SSC	Smaller-scale contingency
USJFCOM	U.S. Joint Forces Command
VCJCS	Vice-Chairman of the Joint Chiefs of Staff

INTRODUCTION

The Luckiest Man in Iraq

In a now-familiar scene, General H. Norman Schwarzkopf, imposing in his desert "battle dress uniform," stood before the press and pointed to the TV on his left. On the screen, a set of bombing crosshairs overlaid a roadbed. Transfixed by the cockpit imagery, the reporters chuckled nervously when someone the general called "the luckiest man in Iraq" drove through the crosshairs. With perfect comic timing, he quipped, "And now, in his rear-view mirror..." as a U.S. precision-guided munition (PGM) detonated, obliterating the road where the driver had just been.[1]

According to the *Gulf War Air Power Survey*, "Few scenes were as vivid on television as the picture of a guided bomb going through a ventilation shaft in an Iraqi office building."[2] A central post-war question was whether such images in fact presaged a new style of combat based on advanced technology: Were we watching the birth of a U.S.-led revolution in military affairs (RMA), or simply slicker packaging of business as usual?

Military history is replete with such revolutions. Starting in the late 1970s, defense analysts in the U.S.S.R. and the U.S. began referring to an ongoing military-technical revolution (MTR), with a focus on high-tech weaponry. By 1993, the Department of Defense's (DoD's) Office of Net Assessment was defining a broader concept, RMA, as "a major change in the nature of warfare brought about by the innovative application of technologies which, *when combined with dramatic changes in military doctrine, and operational concepts*, fundamentally

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[1] *The Gulf War*, Videotape, Produced by Eamonn Matthews and Ben Loeterman, Boston: Frontline, 1996.
[2] Thomas A. Keaney and Eliot A. Cohen, *Gulf War Air Power Survey Summary Report* (Washington, DC: GPO, 1993), 225 (hereafter referred to as *GWAPS*).

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alters the character and conduct of operations."[3]

A new way of war also drives changes in organizational patterns. While dissenters sometimes cite the French Revolution as an example of an RMA without technological changes, this was an exception, and advanced technologies—whether for maneuvering, communicating, or killing—have been central to more recent RMAs. Also important is the idea that RMA realization requires a consensus among leading practitioners and decision makers regarding the presence of change and the need to respond to it.[4]

The Argument: Transformers vs. Hedgers

While some leading practitioners use the terms "transformation" and RMA interchangeably, in this paper I will use transformation to refer to the process of RMA adaptation or integration by military forces.[5] I describe as "transformers" those RMA advocates seeking radical or rapid changes in U.S. military force structure or doctrine.

Transformers have advanced a number of specific proposals over the last few years. Many of these take up the charge of the Congressionally mandated National Defense Panel

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[3] Quoted in Earl H. Tilford, Jr., *The Revolution in Military Affairs: Prospects and Cautions* (Carlisle Barracks, PA: US Army War College Strategic Studies Institute, 1995), 1 [emphasis added]. See also James R. Blaker, *Understanding the Revolution in Military Affairs: A Guide to America's 21st Century Defense*, Progressive Policy Institute Defense Working Paper No. 3 (Washington, DC: Progressive Policy Institute, 1997), 5-6.

[4] The issue of what was or wasn't an RMA in the 20th century is contentious. Historians and analysts have argued over whether *blitzkrieg* (and other forms of combined arms warfare, e.g., Soviet and American versions), strategic bombing, carrier operations, amphibious warfare, nuclear weapons, or ballistic missile operations have been the centerpiece of RMAs. See Williamson Murray, "Thinking About Revolutions in Military Affairs," *Joint Force Quarterly*, Summer 1997, 69-76. For RMA definitions, see James R. Fitzsimonds and Jan M. van Tol, "Revolutions in Military Affairs," *Joint Force Quarterly*, Spring 1994, 25-6; Andrew F. Krepinevich, *The Bottom-Up Review: An Assessment* (Washington, DC: Defense Budget Project, 1994), 46. Also see Tilford, *Revolution*, 2 and Thomas S. Kuhn, *The Structure of Scientific Revolutions*, 3rd ed. (1962; Chicago: Univ. of Chicago Press, 1996), 144-59.

[5] For example, in a recent public address at Harvard University, Admiral Harold W. Gehman, Jr., Commander-in-Chief of U.S. Joint Forces Command, said, "military transformations are major discontinuities in military affairs. They are brought about by developments in technologies or concepts of operation, and are often associated with broader political, social, economic, and scientific revolutions." He then equated transformations with RMAs. See Harold W. Gehman, Jr., "Transforming America's Armed Forces," Remarks to the John M. Olin Institute for Strategic Studies, Cambridge, MA, 14 March 2000, 3. In the same address, Admiral Gehman also pointed out another difficulty with RMAs; that is, you may not be able to tell one has occurred until after the fact (p. 4).

(NDP) that DoD's "[resource] priority must go to the future."[6] Using the savings generated by near-term reductions in force structure, along with revisions or cuts in planned modernization programs, transformers would develop a robust, information-based "system of systems." This system of systems would in turn boost efficiency to the point where DoD could cut future requirements for large, forward-deployed military forces.

Defense analysts like Carl Conetta, Charles Knight, and James Blaker used this approach to argue for 20-30 percent cuts in front-line forces like Army armored and mechanized divisions, Air Force fighter and bomber wings, Navy aircraft carrier battle groups, and Marine regiments. Cuts would occur over eight-ten years and encompass not just equipment, but service people as well. These proposals would also slow or reduce modernization programs, like the F-22 and F/A-18E/F fighters, while increasing procurement of C4ISR[7] assets, like the E-8 Joint Surveillance Target Attack Radar System (JSTARS) aircraft and unmanned aerial vehicles. They posited fairly drastic changes in the organization and doctrine of ground forces, as well as in how the U.S. would maintain overseas presence. An additional transformer focus has been consolidation of functions like Navy and Marine air support, logistics, communications, intelligence, medical care, legal advice, chaplains, and public affairs. The net effect of these proposals would be defense budgets in the $210 billion range (in fiscal year 1997 or 1998 dollars), a vast reduction from current forecasts.[8]

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[6] The National Defense Panel, *Transforming Defense: National Security in the 21st Century* (Arlington, VA: National Defense Panel, 1997), ii.

[7] This acronym started life as the simple, yet elegant "C2," meaning "command and control," but has appended letters over the years to reach its current monstrous state, standing for "command, control, communications, computers, intelligence, surveillance, and reconnaissance."

[8] For specific proposals, see Carl Conetta and Charles Knight, *Defense Sufficiency and Cooperation: A US Military Posture for the Post-Cold War Era*, Project on Defense Alternatives Briefing Report 9 (Cambridge, Mass.: Commonwealth Institute, 1998), 2-3, 24-54; James R. Blaker, "The American RMA Force: An Alternative to the QDR," *Strategic Review* 25:3 (Summer 1997): 21-30; and Blaker, *Understanding*, 19-27. Dr. Blaker, in *Strategic Review*, offered a detailed "acceleration road map" he estimated would cost around $100 billion, but would get the system of systems operating ten-fifteen years earlier than a hands-off approach might. Blaker is also a close associate of Admiral William Owens, about whom I will say more later. Owens himself has argued for support

Changes in both the fiscal and bureaucratic environment have combined to change the thrust of the transformer arguments from cutting force structure to reconfiguring it. In the fiscal arena, U.S. leaders now realize they underfunded defense after the end of the Cold War, to the detriment of readiness and modernization. As a result, DoD can anticipate more robust budgets over the current decade than it saw in the 1990s. In the bureaucratic arena, DoD's last major strategy and force structure review, 1997's Quadrennial Defense Review (QDR), indicated a great resistance to radical change within the department. While some of this conservatism stemmed from organizational inertia, another driver was the taxing demands operations have made (and are making today) on DoD.

As a result, transformers have begun looking at force structures that allow the U.S. to engage in the world *and* pursue transformation. Dr. Blaker and former Vice-Chairman of the Joint Chiefs of Staff (VCJCS) Admiral William Owens have both proposed something they call the "Vanguard Force." This proposal would set aside a significant number of assets in a standing joint task force (JTF) whose mission would be experimentation and transformation. The Vanguard Force would be released from operational requirements and would receive priority for new equipment, along with funding in the range of $2 billion annually.[9]

Army Major General James M. Dubik recently offered a new wrinkle on this concept, proposing what he calls a "strategy-based force structure," with four major elements:

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function consolidation on several occasions. See Admiral William A. Owens, Senator Joseph Lieberman (CT), and Senator Charles Robb (VA), *Hearings Before the Committee on Armed Services*, United States Senate, 105th Congress, 2d Session, 28-29 January 1998 (Washington, DC: GPO), 42-4, 48-50.

[9] James R. Blaker, *A Vanguard Force: Accelerating the American Revolution in Military Affairs*, Defense Working Group Policy Brief (Washington, DC: Progressive Policy Institute, 1997); Admiral William A. Owens, "Revolutionizing Warfare," *Blueprint: Ideas for a New Century* 5 (Winter 2000): 27-8. The Vanguard Force would be composed of approximately 1-3 Army divisions, Air Force wings, Navy carrier battle groups, and a TBD level of Marine and support forces. The newer Owens proposal was more conservative, i.e., on the low end of the scale, than the original Blaker proposal. However, one senses Admiral Owens sees these proposals as a temporary setback, because he states the next U.S. administration "must choose [between sustaining the current force and transforming], and the choices will be wrenching" (p. 27).

- A "prevention and deterrent force" for conventional warfighting and responding to contingencies. Such a force would not be used for day-to-day engagement activities, but would be prepared to project power globally, presumably on short notice.

- An "engagement force" to provide a rotational base for overseas presence, peace support activities, and homeland defense. This force would also form a strategic reserve to augment the prevention and deterrent force, if necessary.

- An "experimental force" analogous to the Vanguard Force.

- A "generation and sustainment force" consisting of support assets, the training infrastructure, education, etc.

In his paper, Dubik does not specify the size of each of these forces or how big a budget the U.S. would need to support his proposal.[10]

Of course, the U.S could choose to posture its military in a completely different way than any of these proposals. One could reasonably argue that the preponderant draw on the U.S. military since the Gulf War has been for multilateral peacekeeping and humanitarian intervention missions in places like Somalia, Haiti, Bosnia, and Kosovo.[11] As a result, would it perhaps be better for the U.S. to "dumb down" its forces, trading off expensive technological advances and modernization for more troops, along with the relatively less sophisticated equipment required to conduct these smaller-scale contingencies (SSCs)? I believe the answer here must be "no." Inasmuch as "Our Armed Forces' foremost task is to fight and win our Nation's wars," it would be counterproductive in the extreme to bypass technologies allowing the U.S. to do just that.[12] I

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[10] James M. Dubik, *Building a Strategy-Based Force Structure*, Landpower Essay Series No. 99-10 (Arlington, VA: Association of the U.S. Army's Institute of Land Warfare, 1999), 5-9.

[11] For an excellent synopsis of such missions and their effects, see Rowan Scarborough, "Record Deployments Take Toll on Military: 48 missions in '90s Tax Troops, Budget," *Washington Times*, 28 March 2000, A6.

[12] John M. Shalikashvili, *National Military Strategy: Shape, Respond, Prepare Now--A Military Strategy for a New Era*, 1997, <http://www.dtic.mil/jcs/nms/executiv.htm> (cited 8 March 2000), para. 4 under "Introduction." General "Shali" was CJCS when he wrote this. Alan J. Kuperman, in a recent *Foreign Affairs* article, recommends the U.S.

will therefore discount this alternative up front.

For its part, DoD has opted for a middle path between radical transformation and dumbing down: what I call here "hedging." Given a busy present and an uncertain future, DoD asserts its projected force structure and modernization plans will accommodate the broadest range of anticipated tasks. Also, according to Secretary of Defense (SecDef) William Cohen, DoD must ensure "the United States maintains sufficient military capabilities over the longer term to deter or defeat aggression by an adversary that proves to be more capable than current foes or under circumstances that prove to be more difficult than expected."[13] However, this neither tells the complete story nor offers the complete solution.

Hence, this paper argues that the U.S. defense establishment, despite an inherent American affinity for technology, and powerful RMA advocates inside DoD, has by and large rejected radical transformation. More significantly, given an uncertain strategic forecast, I maintain the U.S. should not move to transform its military radically. I say *should not move to* instead of *should not* to avoid being categorical. Thus, I leave the door open for radical transformation at some point if the future situation dictates. However, it is not the case now.

The U.S. also needs to consider how any changes in its military posture will affect its foreign policy, specifically its ability to build and sustain effective military alliances and coalitions. By changing in different ways, or at a faster pace, than key military partners, the U.S. could unintentionally reduce its global influence. Further, Americans should not delude themselves, or let themselves be deluded, about what transformation can really accomplish. Technology will not make war less horrible, and a smaller, transformed force may fall short of

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conduct a "rigorous debate" on the utility of this kind of force sizing and shaping. See Alan J. Kuperman, "Rwanda in Retrospect," *Foreign Affairs* 79:1 (January-February 2000): 118.

what the U.S. will likely need its military to do in the coming decades. However, by shunning radical transformation in favor of a hedging approach to overall military strategy, the U.S. assumes an obligation to keep itself maximally flexible.

One caveat: I am not a Luddite. Technological innovation is critical to warfighting, always has been, always will be. Consider the phalanx, stirrup, longbow, pike, gunpowder, rifle, machine gun, airplane, nuclear weapon, ballistic missile, etc., along with their associated strategic/operational/tactical doctrines. Even so, the advantages of any one innovation are typically short lived, though they can be considerable while they prevail. Another problem is that in peacetime, or relative peacetime as we have come to know it, you will almost never know if you are pursuing the right innovations, and the odds are you will not. In the end, "It is the task of military science in an age of peace to prevent the doctrines from being too badly wrong," as historian Sir Michael Howard sagely noted.[14] Still, the process of thinking through problems and experimenting with solutions can contribute considerably to later success.

Yet, I take issue with those transformers who maintain a near canonical faith in technology's ability to yield military victory. Their zeal is potentially bad for U.S. security, because while you can plan for the wars you would like to fight, you have to fight the wars you face. The two, of course, are rarely the same. The interwar French and the U.S. in Vietnam are recent examples of nations that failed to appreciate this fundamental point.[15]

In this paper, after a brief synopsis of the current RMA, I will assess why significant

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[13] William S. Cohen, Secretary of Defense, to Hon. Strom Thurmond, Chairman, U.S. Senate Committee on Armed Services, "Comments on Report of National Defense Panel," Memorandum, 15 December 1997, 4 (also: 15 December 1997, <http://www.dtic.mil/ndp/comments/secdefcom.pdf> (cited 12 April 2000)).

[14] Michael Howard, "Military Science in an Age of Peace," *RUSI: Journal of the Royal United Services Institute for Defence Studies* 119:1 (March 1974): 7.

[15] For a brief synopsis of the French approach, see Arthur J. Corbett, *Proliferating Decision Makers: Root Cause of the Next RMA*, Strategy Research Project (Carlisle Barracks, PA: U.S. Army War College, 1998), 36. For a thorough review of the subject, see Robert Doughty, *The Seeds of Disaster: The Development of French Army*

transformation of U.S. military forces has not ensued.[16] After assessing the future, I will then

contrast arguments for and against radical transformation in light of its potential effects on U.S.

foreign policy and the nature of warfare. Concluding that the U.S. would be ill advised to turn

its swords into either plowshares or quantum ray guns, I will offer recommendations for the U.S

to hone its already formidable swords into sharper stilettos via a carefully crafted hedging

strategy.

Doctrine, 1919-1939 (Hamden, CT: Archon Books-The Shoe String Press, Inc., 1985). Also see Mackubin Thomas
Owens, "Technology, the RMA, and Future War," *Strategic Review* 26.2 (Spring 1998): 63, 67-8.
[16] Hereafter, for simplicity, when I use "RMA" I am indicating the current information-based phenomenon, unless
otherwise indicated.

THE REVOLUTION THAT WASN'T

Despite the Gulf War's promise of a new way of war, DoD's primary focus in the 1990s was on downsizing on the one hand, and coping with an exhaustingly fluid world environment on the other. An exception was a brief period in the mid-1990s, when VCJCS Admiral Owens galvanized the transformation cause within DoD. However, institutional resistance and operations tempo eventually prevailed, leaving transformation as a still-contentious issue. Its continued strength is testimony to its attraction. But where did the ideas for the RMA come from in the first place?

Hyperwar, Cyberwar, and the Holy Grail

In essence, this RMA is about maximizing one's ability to gain and exploit information while denying the same to an adversary. This is a timeless ideal, with a theoretical foundation in what British theorist J.F.C Fuller called the mental and moral spheres of war. In the 1970s and 1980s, Soviet writers seized on psychological disruption as a key to operational maneuver, with the ultimate goal of enemy strategic paralysis. In the U.S., retired Air Force Colonel John Boyd developed a theory of competing decision cycles, using something he called the OODA (observation-orientation-decision-action) loop. Boyd's concept stemmed from the tactical level of air-to-air combat, but has prescriptive power for all levels of warfare.[17] Originally falling

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[17] For an ancient view (ca. 500 B.C.), see Sun Tzu, *The Art of War*, trans. Samuel B. Griffith (1963; rpt. London: Oxford Univ. Press, 1971), 66-70. Also see J.F.C. Fuller, *The Foundations of the Science of War* (London: Hutchinson & Co., 1926), 93-143. Late 1970s-early 1980s Soviet doctrine captured much of what the world witnessed during DESERT STORM. They explored ideas like vertical envelopment of an enemy, precision weapons, use of satellite communications down to the lowest tactical level, information warfare (seen as having the potential to influence the outcome of engagements before they even start), and automated fire control systems, called "reconnaissance-strike (or fire) complexes." The key champion of these notions was Marshal N. V. Ogarkov. See Mary C. FitzGerald, "The Soviet Military and the New Air War in the Persian Gulf," *Airpower Journal* 5:4 (Winter 1991): 64-78; Blaker, *Understanding*, 5-6; and Harold S. Orenstein, "Warsaw Pact Views on Trends in

under the rubric of command and control warfare, Boyd's idea later re-emerged in the broader

area first called "information warfare," but now termed "information operations" in joint

doctrine.[18]

The 1991 Gulf War visually and viscerally thrust these theories into life. Iraq seemed

frozen by the coalition's high-tech onslaught, especially from the air. A new warfighting trinity

appeared: stealth (or low observability), precision-guided munitions, and information

technologies. In reality, none of these elements, at least individually, were unveiled in the Gulf

War. F-117 stealth fighters first saw service in Operation JUST CAUSE against Panama in

1989, U.S. forces had used precision-guided munitions as early as World War II, and information

from computers, space systems, and command and control networks has been part of U.S.

warfare for years. What was new was the way the U.S. military seemed to weave these elements

together to achieve near-simultaneous effects against whole target classes, as well as to achieve

mass with strikingly fewer resources than ever before.[19]

The ground offensive's unprecedented "left hook" only cemented the notion that

something radical was afoot. More cynically, another twist may have been the U.S.-led

coalition's manipulation of the Western media to highlight its dramatic new way of war, dubbed

"hyperwar" by adherents.

Gulf War press coverage put air power on hyperwar's center stage, providing the war's

Ground Forces Tactics," *International Defense Review* 9 (September 1989): 1149-52. As one who has seen him in action, I would say Colonel Boyd comes off as both brilliant and eccentric. Despite not publishing his theories anywhere, they have gained cachet by virtue of their power and word-of-mouth. He has made a large collection of unpublished materials, mainly briefings, available at Maxwell AFB, AL. For an interesting study of Boyd and another influential theorist, Colonel John Warden, see David S. Fadok, *John Boyd and John Warden: Air Power's Quest for Strategic Paralysis*, Thesis, School of Advanced Airpower Studies 1994 (Maxwell AFB, AL: Air Univ. Press, 1995).

[18] For detailed treatment, see Joint Pub 3-13, *Joint Doctrine for Information Operations*, 9 October 1998 <http://www.dtic.mil/doctrine/jel/new_pubs/jp3_13.pdf> (cited 9 March 2000). "Information warfare" has recently been narrowed to mean "Information operations conducted during time of crisis or conflict to achieve or promote specific objectives over a specific adversary or adversaries" (p. GL-7). Since it is probably better known in the general discourse, I will use information warfare here.

most dramatic imagery. Air and space power, returned today to the 1950s term "aerospace"

power by the U.S. Air Force, appeared to be emerging as a dominant way of waging war, if not

the dominant way.[20]

For Americans, hyperwar seemed a particularly seductive silver bullet. First, it tickled

our natural affinity for technology and our progressive tendencies. Second, the war validated our

general sense of superiority. Third, it reinforced our seeming aversion to both our own military

casualties, as well as enemy civilian casualties, an umbrella even extended over enemy

combatants at times. Modern aerospace power appeared to mute war's horror in a physical and

psychological sense. Hyperwar promised ever-quicker, cleaner, and more decisive victories in

the future.[21]

In the end, however, many analysts concluded the Gulf War was something of a

"precursor" event, offering hints, but no definitive vision, of the future. Were we undergoing a

paradigm shift as described by Thomas S. Kuhn in *The Structure of Scientific Revolutions,* or

were we perhaps heading bravely into a world without paradigms, wherein chaos, uncertainty,

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[19] Keaney and Cohen, 224-7, 238-45.

[20] See Tilford, *Revolution,* 9, and Keaney and Cohen, 246. The war foiled predictions many 1980s defense experts had made, as most of the expensive, Reagan-era systems actually seemed to work. And work well. Also see Richard P. Hallion, *Storm over Iraq: Air Power and the Gulf War* (Washington, DC: Smithsonian Institution Press, 1992), 1-4, 241-4, 263-8.

[21] Keaney and Cohen, 248-51; Stephen Blank, "How We Will Lose the Next War With Russia: A Critique of U.S. Military Strategy," unpublished paper presented to the Annual Strategy Conference of the Strategic Studies Institute of the U.S. Army War College, Carlisle Barracks, PA, 31 March-2 April 1998, 48-51 (cited with permission of the author). As early as World War I, Americans were revolted by what seemed to be the European model of protracted, attritional land warfare. U.S. leaders' shock upon seeing the Gulf War's "highway of death" highlights the idea that enemy combatant casualties could also reduce popular support for wars. See Colin L. Powell with Joseph E. Persico, *My American Journey* (New York: Random House, 1995), 520-1 and Charles J. Dunlap, Jr., *Technology And The 21st Century Battlefield: Recomplicating Moral Life For The Statesman And The Soldier* (Carlisle Barracks, PA: U.S. Army War College Strategic Studies Institute, 1999), 3-4. Notably, the *GWAPS* disputed the causal effect the highway of death may have had on President Bush's decision to stop the war. See Keaney and Cohen, 250. Today, emerging research also indicates the American populace may be less sensitive to casualties than the conventional wisdom holds. See Peter D. Feaver and Christopher Gelpi, "A LOOK AT...Casualty Aversion; How Many Deaths Are Acceptable? A Surprising Answer," *Washington Post,* 7 November 1999, B3. Finally, for historic descriptions of air power's resonance with the American "psyche," see Michael S. Sherry, *The Rise of American Air Power: The Creation of Armageddon* (New Haven, CT: Yale Univ. Press, 1987), 1-7, 19-21, 29-46, 53-61.

and entropy would rule?[22]

Theorists wrestled with these questions. Information warfare, sometimes called "cyberwar," emerged as a powerful discipline in its own right, tying together command and control warfare, computer security, network administration, physical attack, electronic attack, psychological operations, deception, and intelligence. Cementing the concept's bureaucratic position, in early 1993 the U.S. Military Academy appointed a visiting professor of information management and the National Defense University introduced their first course on information warfare. The military services quickly followed suit. For example, the U.S. Air Force established its Information Warfare Center in September 1993, followed by its first information warfare squadron in October 1995. Filtering into general discourse and popular culture, cyberwar also occupied a prominent position in Alvin and Heidi Toffler's *War and Anti-War: Survival at the Dawn of the 21st Century.*[23]

Cyberwar became a central theme in future war scenarios. Some of these scenarios posited the injection of viruses and other corrupting elements into computer networks, either sequentially or simultaneously with physical attacks. If such networks controlled essential elements of society—something mirror-imaging Americans readily assumed—then network loss or degradation would lock an enemy into strategic paralysis and coerce him, perhaps without having to fight at all. According to Sun Tzu, the ancient Chinese theorist, "to subdue the enemy

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[22] For views of the Gulf War as a precursor to a revolution, see Keaney and Cohen, 239, 251, and Krepinevich, 46. I can recall several lecturers citing Kuhn with regard to airpower and the Gulf War when I attended the U.S. Air Force's Air Command and Staff College in 1992-3. On a paradigm-free world, see Thomas J. Czerwinski, "The Third Wave: What the Tofflers Never Told You," (Institute for National Strategic Studies) *Strategic Forum* 72 (April 1996): 1-4; Corbett, 20-34; and George Gilder, *Microcosm: The Quantum Revolution in Economics and Technology* (New York: Touchstone Simon & Schuster Inc., 1989), 17-31.

[23] In this wide-ranging work, the Tofflers also delved into the exotica of high-tech weaponry like infrasound generators, causing targets to lose control over their bodily functions, and micro-robots. Alvin and Heidi Toffler, *War and Anti-War: Survival at the Dawn of the 21st Century* (Boston: Little, Brown, and Co., 1993), 118-52. For Air Force initiatives, see Department of the Air Force, "Air Intelligence Agency," *U.S. Air Force Fact Sheet 95-10* and Pat McKenna, "Info Warriors: Battling for Data Dominance in the Fifth Dimension," *Airman* 40:9 (September 1996): 26-31.

without fighting is the acme of skill." While cyberwar was analogous to a theory the U.S. Army Air Corps developed in the 1930s, of bombing critical nodes in an enemy's "industrial web" to induce defeat, its immediate effects were generally assumed to be non-lethal. In the notion's extremity, cyberwarriors would also conduct hyper-psychological operations, altering an enemy's internal information distribution by manipulating news, imagery, and other media.[24]

A sense of omniscience and omnipotence has also dominated RMA thinking in the U.S. The following quote from former U.S. Air Force Chief of Staff General Ronald Fogelman captures the essence of aerospace power: "It will dominate warfare well into the twenty-first century. To describe this for those with an interest but less vision and understanding, we began to talk about how we will be able to *find, fix, track, target and engage* anything of consequence which moves on the face of the earth or through the atmosphere—in near real time." By some estimates, this could be done "at minimal cost and with little collateral damage."[25]

Other theorists have accepted cyberwar and pervasive global attack as givens and are looking ahead to even more radical changes. Here, speculation treads deeply into the exotic. For example, Army officer Lonnie D. Henley argues the U.S. has a safe lead in the current RMA, but needs to start thinking about the truly revolutionary potential of the "RMA after next." Citing advances in micro-miniaturization, i.e., "nanotechnology," perhaps in conjunction with biotechnology, Henley describes a battlespace inhabited by designer biological toxins,

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[24] Rachel Bronson and Daniel Goure, "Diplomatic Consequences of the Coming RMA: When the U.S. Is Unrivaled Militarily, What Happens to Our Alliances?" *Foreign Service Journal* 75:9 (September 1998): 26; Sun Tzu, 77 (quote). For a detailed description of the Air Corps Tactical School theorists, see Haywood S. Hansell, Jr., *The Air Plan that Defeated Hitler* (Atlanta, GA: Higgins-McArthur/Longino & Porter, 1972). Airpower theorist John Warden describes the key elements of production as "organic (or system) essentials," viewing them as the second most viable enemy target set, after leadership. See John A. Warden III, "Air Theory for the Twenty-First Century," in *Battlefield of the Future: 21st Century Warfare Issues*, rev. ed., eds. Barry R. Schneider and Lawrence E. Grinter (Maxwell Air Force Base, AL: Air Univ. Press, 1998), 107-8, 114-5. The problem with many of these theories is they assume a technology dependent and inelastic adversary, as well as friendly use of legally dubious means with unknown secondary effects. See discussion below and Dunlap's paper (cited above).

[25] Speech by General Ronald Fogelman to National Convention of Order of Daedalians reprinted in *Daedalus Flyer* 39:3 (Fall 1999): 14 [first quote, emphasis added]. For second quote, see Fitzsimonds and van Tol, 27.

mechanical/biomechanical fighting "fire ants," "surveillance dust" mini-sensors, and other

fantastic gizmos. Of course, nobody yet knows the legal and environmental implications, among

other consequences, of such means. In reality, they may not become clear until after such

weapons see combat.[26]

Meanwhile, Back at the DoD

Despite the obvious groundswell of interest in the RMA, DoD's focus during the 1990s

was on downsizing the U.S. military establishment. Concurrently, it tried to cope with an

increasingly complex international environment. Force drawdown guidance began with the Bush

administration's "Base Force," but the Clinton administration's *Report on the Bottom-Up Review*

directed deeper cuts yet. Initiated in March 1993 by then-SecDef Les Aspin, the Bottom-Up

Review, or BUR as military acronymists dubbed it, held the central assumption "that the United

States must field forces capable, in concert with its allies, of fighting and winning *two major*

regional contingencies that occur nearly simultaneously."[27]

The two major regional contingency (MRC)—now called major theater war (MTW)—

construct drove the size of most U.S. forces, an important exception being aircraft carriers,

amphibious ships, and other naval combatants. These forces received an additional size

increment "to reflect the exigencies of overseas presence, as well as the warfighting requirements

of MRCs," giving a bureaucratic advantage to the Department of the Navy.[28]

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[26] Lonnie D. Henley, "The RMA After Next," *Parameters* 29: 4 (Winter 1999-2000): 46-57.

[27] A major, ongoing critique of DoD's downsizing has been that it has made greater cuts in force structure than infrastructure. Les Aspin, *Report on the Bottom-Up Review* (Washington, DC: Department of Defense, 1993), iii [emphasis added].

[28] Aspin, 19-25 (quote on p. 24), 27-31. Although presented somewhat ambiguously, the BUR forecast a 1999 force structure with major conventional elements as follows: 15+ Army divisions (10 active and 5+ reserve), 12 carrier battle groups (11 active/1 reserve or training), 20 fighter wings (13 active/7 reserve), and 4 Marine Expeditionary Forces (3 active/1 reserve). The ambiguity arises, for example, in Fig 7 (p. 28), where the report shows "5+ divisions" in the Army reserve, but in Fig 8 (p. 30), under option 3, shows "15 Reserve Enhanced–Readiness

The BUR has attracted criticism since its release. It was not revolutionary in scope, but instead posited a force structure much like the one that had won the Cold War, only smaller, and, as it has turned out, too lean to meet a robust U.S. foreign policy of engagement. While warning that "in planning forces capable of fighting and winning major regional conflicts, we must avoid preparing for past wars," it used illustrative—also called "canonical"—scenarios involving Iraq and North Korea that looked a lot like the Gulf War. Its four-phase approach to warfighting was sequential/linear in nature, giving apparent primacy to important roles for all the services over innovative doctrinal approaches.[29]

Thus, the BUR did not foresee contingencies like Operation ALLIED FORCE (the 1999 conflict over Kosovo), where the U.S. committed only aerospace assets, but at an MRC/MTW level; or NATO's Implementation Force for Bosnia, with its heavy ground force commitment. This brings out perhaps the BUR's most serious flaw: its assumption that a force sized for two MRCs could perform peacekeeping, peace enforcement, and other interventions as a subset of its primary mission, albeit with some specialized training and equipment. This repeats a mistake the U.S. made in Vietnam and has relevance for how the U.S. should posture its forces in the future.[30]

The BUR did not address the RMA as such, but supported keeping the U.S. lead in fields like information and material technologies. Its fairly extensive section on modernization focused

Brigades," roughly the same thing, but inconsistent in presentation. Further, Navy amphibious ready groups (with embarked Marine expeditionary units), are not really broken out, though they form a key element of overseas presence. For that matter, while concerning itself with fighter wings as building block units for the Air Force, the BUR treats "bombers" as an aggregate, although they, too, are organized into wings of three quite different airframes. Finally, force structure for support assets got only cursory treatment in the report, doing DoD a disservice, I believe.

[29] For BUR references in this and the next paragraph, see Aspin, 8-9, 13-23 (quote on p. 14).

[30] Further, the BUR assumed the U.S. could fairly easily extricate its forces from such operations (or forego them altogether) when faced with two MRCs. For the various critiques, see Krepinevich, 11-40, 55-63; Statement of Chairman Floyd D. Spence (May 21, 1997) in Committee on National Security, House of Representatives, 105th Congress, 1st Session, *The Quadrennial Defense Review Hearings*, 16 April, 21-22 May 1997 (Washington DC:

on specific program areas, e.g., theater air forces, ballistic missile defenses, and aircraft carriers. However, the BUR's consistent emphasis was more on cutting than building.[31]

Enter the Transformers

In the early 1990s, the Pentagon's center of RMA advocacy was SecDef's Office of Net Assessment. Its director, Andrew Marshall, has served in that capacity since the organization's inception in the early 1970s. Originally focusing on the U.S.-U.S.S.R. military balance, this office began tracking Soviet thought on the MTR in the late 1970s. After the Soviet Union's demise, Marshall picked up the transformation banner and expanded the MTR idea into the more holistic RMA. According to James Blaker, Marshall has provided DoD with the "deeper historical sense of how revolutions in military thought occur."[32]

As DoD was still assessing the BUR's impact, a powerful agent for change emerged within the Pentagon in the person of Admiral William A. Owens, who assumed the position of VCJCS in 1994. He quickly tied "jointness" to the RMA in his statutory role as chairman of the Joint Requirements Oversight Council (JROC). He expanded this four-star level body's purview from a narrow one on system acquisition to a broad one on programs in general, with the RMA always in the foreground.

Admiral Owens used two mechanisms to increase the JROC's influence. First, he set up a series of assessment teams along nine broad functional areas, with members drawn from throughout DoD, but with Joint Staff chairpersons. These teams collectively formed the Joint Warfighting Capabilities Assessment. Second, the JROC helped the Chairman of the Joint

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GPO, 1997), 111; Eliot A. Cohen, "Prepared for the Last (Cold War)," *Wall Street Journal*, 12 November 1999, A18; and W. Owens, "Revolutionizing," 26-7. For the Vietnam analogy, see Tilford, *Revolution*, 7.

[31] Aspin, 11-2, 33-70.

Chiefs of Staff (CJCS) develop substantive guidance for service program development, and then assessed how well the resultant programs adhered to the guidance. As a result, JROC blessing quickly became essential to the success of service initiatives.[33]

Admiral Owens upset the natural order within DoD. Many defense analysts criticized his devotion to technology. On the other hand, he gained passionate devotees inside the Beltway, especially in Congress. He could be open minded, stretching the envelope with ideas like mobile off-shore bases, huge man-made islands to replace or augment aircraft carrier battle groups. He also believed military officers needed enhanced diplomatic and foreign area skills to be effective in an increasingly interdependent world. His central, and most controversial, initiative was his support for a system of systems to "allow us to gather, process, and fuse information on a large geographical area in real time, all the time; that allow[s] us to transfer that information—call it knowledge—to our forces with accuracy; and that provide[s] us the capacity to use force with speed, accuracy, precision, and great effect over long distances."[34]

For the scope of the system of systems, Owens frequently referred to a 200-mile x 200-mile area, roughly the size of Iraq or North Korea. In effect, he sought a technological Rosetta Stone for what Prussian theorist Carl von Clausewitz termed the "fog" and "friction" of warfare, thus creating a dominant operational advantage for U.S. forces (see General Fogelman's comment above). In Owens' view, this would leave little need to close with the enemy or

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[32] Blaker, *Understanding*, 5-6; Andrew Marshall, "Warrior in the Age of Intelligent Machines," interview by Peter Schwartz, *Wired*, April 1995, 138.

[33] The Joint Warfighting Capabilities Assessment's graphic depiction as a 9 x 6 matrix came to be called the "galactic radiator" by irreverent action officers. As a secondary effect, Owens' moves further concentrated power in the Joint Staff, particularly its Force Structure, Resources and Assessment Directorate (J-8) as the JROC's executive agent. See William A. Owens, "JROC: Harnessing the Revolution in Military Affairs," *Joint Force Quarterly*, Summer 1994, 55-7. Also see Blaker, *Understanding*, 7-8.

[34] Former SecDef William Perry coined the term system of systems. For a synopsis of it, see William A. Owens, "The American Revolution in Military Affairs," *Joint Force Quarterly*, Winter 1995-96, 37-8 (quote on p. 37) and Admiral William A. Owens, *Hearings Before the Committee on Armed Services*, United States Senate, 105th Congress, 2d Session, 28-29 January 1998 (Washington, DC: GPO), 39-43. For a more detailed exposition, see Blaker, *Understanding*, 8-11. For mobile off-shore bases, see Blaker, "American RMA Force," 26.

maintain traditional operational hedges like reserve forces or backup communications.[35]

The RMA's cachet inside the Pentagon reached an apex in 1996, with the release of *Joint Vision 2010 (JV 2010)*. This was a major effort by the services and Joint Staff, which in the end involved the Joint Chiefs of Staff directly in its drafting. Thus, like many Pentagon products, it was the child of consensus.[36] However, unlike many Pentagon products, it was fairly original in its long-term view of almost fifteen years, as DoD's typical perspective is either on the present, the next one-two years (the budgetary time frame), or six years out (the maximum reach of the Future Years Defense Program).[37]

JV 2010 forged the raw materials of the RMA—stealth, precision, and information—into four operational concepts and a fundamental prerequisite the document termed an "enabling construct." The operational concepts were dominant maneuver, precision engagement, full-dimensional protection, and focused logistics. The enabling construct was information superiority, which lets forces use the operational concepts to achieve massed effects without

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[35] Clausewitz has assumed a utilitarian role in the argument between pro- and anti-RMA forces, as have concepts such as chaos and complexity. All are used to make each side's respective cases and negate the other side's arguments. For Clausewitzian critiques of Admiral Owens, see Paul van Riper and Robert Scales, "Preparing for War in the 21st Century," *Strategic Review* 25:3 (Summer 1997): 14-20 and M. Owens, 63-70. For the original discussion of fog and friction, see Carl von Clausewitz, *On War*, ed. and trans. Michael Howard and Peter Paret (Princeton, NJ: Princeton Univ. Press, 1976), 119-21, 140 *inter alia*. For lavish praise of Admiral Owens, see *Hearings Before the Committee on Armed Services*, United States Senate, 105th Congress, 2d Session, 28-29 January 1998 (Washington, DC: GPO). Finally, some of the above is also based on my personal observations as a Joint Staff action officer from 1994-1996.

[36] I was a minor player in the original development of a number of *JV 2010's* concepts when I worked in the Joint Staff's Directorate for Strategic Plans and Policy. For the Pentagon insider, there are a number of tidbits indicating areas of probable compromise/consensus. For example, on p. 16, we see "a system of systems" and on p. 24 "seamless joint architecture," favored terms of Admiral Owens. Sample of other inserts with a service flavor include "tailor-to-task organizational capability" (a probable Marine Corps construct) on p. 21, the advantages of parallel or concurrent operations over sequential ones (an Air Force preference) on pp. 15 and 21-22, and the continued need for "boots on the ground" and other forms of "intensive physical presence" (certainly resonant with the Army and Navy) on pp. 14, 18, and 27.

[37] Stephen Peter Rosen, *Winning the Next War: Innovation and the Modern Military* (Ithaca, NY: Cornell Univ. Press, 1991), 257.

massing forces, thereby gaining more "bang for the buck" while reducing their own risk.[38]

JV 2010 had several flaws or omissions. While seeking "full spectrum dominance" across the range of conflicts, it was decidedly high-end, i.e., combat, oriented. This was especially true in its optimistic portrait of the system of systems. In general, *JV 2010* left the reader with an impression that technological superiority determines military success. The major negative effect of its use of broad, generic ideas is its intellectual elasticity. It can be all things to all people, and it is easy to justify virtually any system using at least one of its criteria. Furthermore, by fostering the use of "forces optimized for wartime effectiveness" in a variety of operations, it skirted the important issue of what prolonged use of forces in these capacities might cost in combat readiness terms.[39]

Nonetheless, *JV 2010* articulated a more far-sighted approach than normal for DoD. To the authors' credit, it also paid significant attention to quality people, training, education, organization, and doctrine. Most important, as a template for defense transformation, its acceptance was widespread, and the 1997 QDR widely cited it in the next round of force structure decisions.[40]

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[38] "Information superiority" is sometimes called "dominant battlespace awareness/knowledge." See John M. Shalikashvili, *Joint Vision 2010* (Washington, DC: Office of the Chairman of the Joint Chiefs of Staff, 1996), 11-3, 16-25.

[39] Shalikashvili, *JV 2010*, 10-5, 17-8, 21, 25. For critiques, see *Report of the Defense Science Board Task Force on DoD Warfighting Transformation* (Washington, DC: Office of the Under Secretary of Defense for Acquisition and Technology, Sep 1999), 16, 29; Blank, 46-7 (cited with permission of the author); and (scathing) Williamson Murray, "Does Military Culture Matter?" in *The Future of American Military Culture*, eds. John F. Lehman and Harvey Sicherman (Washington, DC: Foreign Policy Research Institute, 1999), 24. On the subject of readiness costs, see General Henry Shelton, quote from: U.S. Congress, Hearing of the Senate Armed Services Committee, "Status of the U.S. Military Forces," (Date: 9/29/98), text from: *Federal Information Systems Corporation Federal News Service*, available from: *Congressional Universe* (Online Service), Bethesda, MD: Congressional Information Service. Regarding *JV 2010's* high-end focus, a telling point is the graphic on p. 20 showing an enemy armored force in open desert terrain. The force is surrounded by friendly armor, naval forces off the nearby shore, and aerospace power above, illustrating the concept of dominant maneuver. One wonders how this would look with enemy irregular forces dug into mountainous, heavily forested terrain, mixed in with the civilian population, in an inland area covered by clouds, e.g., Kosovo.

Transformation in the Limelight: the QDR, the NDP, and Beyond

The Military Force Structure Review Act, part of the defense authorizing legislation for

fiscal year 1997, mandated the QDR. By many accounts, the QDR was a tumultuous and

exhausting effort, running formally from December 1996 to May 1997, but in reality lasting

longer. It involved the Office of the Secretary of Defense (OSD), Joint Staff, military services,

and combatant commands, yielding the *Report of the Quadrennial Defense Review (QDR*

Report) in May 1997.[41]

The QDR assessed U.S. capabilities and requirements for the period 1997-2015. Its

report outlined a trilateral defense strategy of shaping the international environment, responding

to the full spectrum of crises, and preparing now for an uncertain future: in shorthand, "shape—

respond—prepare." To achieve the strategy's objectives, the U.S. would need a "balance of

capabilities" over the period, although DoD was to accomplish any force structure and personnel

reductions by fiscal year 2003. The QDR also operated under an assumption of a steady $250

billion ceiling on defense budgets (in fiscal year 1997 dollars), using savings from force structure

cuts and improved business practices to boost modernization accounts to a level of $60 billion

annually. These savings, or "offsets" in Pentagon parlance, would finance long-term preparation

for the future.[42]

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[40] Shalikashvili, *JV 2010*, 5-7, 18, 27-31; William S. Cohen, *Report of the Quadrennial Defense Review* (Washington DC: Department of Defense, 1997), iv-viii.
[41] W. Cohen, *Report of the QDR*, 1-2. For original legislation, see Public Law 104-201: "National Defense Authorization Act for Fiscal Year 1997," (110 Stat. 2422; Date: 9/23/96; enacted H.R. 3230), text from: *United States Public Laws*, available from: *Congressional Universe* (Online Service), Bethesda, MD: Congressional Information Service. This legislation failed to mandate recurrent reviews, a discrepancy the National Defense Authorization Act for FY 2000 rectified by mandating a new review "every four years, during a year following a year evenly divisible by four," which, starting with the 1997 review, places them immediately after each presidential election. This maximizes the potential for reform by placing the review at a time when administrations typically have their greatest political power. See Public Law 106-65: "National Defense Authorization Act for Fiscal Year 2000" (113 Stat. 512; Date: 10/5/99; enacted S.1059), section 901, text from: *United States Public Laws,* available from: *Congressional Universe* (Online Service), Bethesda, MD: Congressional Information Service.
[42] W. Cohen, *Report of the QDR*, v, 2, 9-16, 19-22, 39, 53-63, 66. The $250 billion assumption has been overcome by events (see below).

The QDR heavily hedged its proposals. This was due to its assessment of strategic uncertainty for the long term, coupled with a need to maintain robust capability in the near term. Hence, its recommended reductions were relatively modest and, in fact, DoD has subsequently rescinded or reevaluated some cuts. At bottom, the QDR perpetuated the BUR's force-sizing methodology, thus producing a similar force structure.[43]

Also like the BUR, the QDR was not revolutionary in its approach to the RMA. Tasked by Congress to examine "the effect on the force structure of the utilization by the Armed Forces of technologies anticipated to be available by the year 2005, including precision guided munitions, stealth, night vision, digitization, and communications, and the changes in doctrine and operational concepts that would result from the utilization of such technologies," the *QDR Report* by and large compiled and restated existing service visions and *JV 2010*. It also used service views on how they were integrating RMA concepts, rather than offering top-down guidance of its own. What resulted was something of a forced fit of existing or planned systems into *JV 2010's* elastic concepts. Specific programmatic recommendations included cutting the JSTARS from nineteen to thirteen aircraft, a blow to the system of systems. Regarding the Army's *Force XXI* initiative, the QDR accelerated fielding of a digitized corps, but placed two crucial elements of the force, the RAH-66 Comanche helicopter and Crusader self-propelled howitzer system, in jeopardy by staking their funding on efficiency savings, e.g., from politically

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[43] Examples of actual/potential rescissions include the QDR's recommended cut of 45,000 Army Reserve Component personnel and the reduction in attack submarines from seventy-three in fiscal year 1997 to fifty by fiscal year 2003. Secretary Cohen recently decided to stop the planned cut of Army reservists/guardsmen at 20,000 personnel due to emerging real-world requirements for the Army National Guard and Reserve; see "Defense Official Won't Cut 25,000 Reservists," *Milwaukee Journal Sentinel*, 21 December 1999, 5. The Joint Staff completed a study in late 1999 reportedly recommending a fleet of 55-68 attack submarines. OSD followed with a program budget decision awarding the Navy $1.1 billion for initiatives to potentially build up the attack sub fleet; see Hunter Keeter, "Fages: QDR Submarine Numbers Won't Meet Future Needs," *Defense Daily*, 19 November 1999, 1, and Peter J. Skibitski, "Navy Submarine Force Size to Increase Under New Budget Plan," *Inside The Navy*, 10 January 2000, 1. Also see W. Cohen, *Report of the QDR*, 22-32, and Kathleen M. Conley, "Campaigning for Change," *Airpower Journal* 12:3 (Fall 1998): 62-4.

untenable base realignments and closures or the so-called revolution in business affairs.[44]

Under the same legislation mandating the QDR, and against the wishes of the Clinton administration, Congress tasked SecDef to appoint a "nonpartisan, independent panel to be known as the National Defense Panel [NDP]." The NDP's mission was to assess the QDR and derive alternative force structures to counter a range of threats to U.S. interests through 2010, which the panel extended to 2020. The panel was to produce a report for SecDef by December 1997. SecDef, in turn, would pass the report, along with his comments, to Congress. Both parties met these deadlines.[45]

The NDP substantively challenged the QDR's findings. Its chief point of departure concerned the RMA, and it urged DoD to accelerate transformation to ensure the U.S. could meet security challenges in 2010-2020. It saw DoD's continued reliance on the two-MTW construct as the biggest inhibitor to transformation. In short, the NDP accused DoD of mortgaging the future to hold on to force structure for a low probability scenario, the only point that SecDef directly challenged in his formal response to the NDP. Posing a faulty dilemma, the

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[44] The review also reduced the planned buy for all three tactical air (TACAIR) programs, the F-22, F/A-18E/F, and Joint Strike Fighter (JSF), along with the Marine MV-22 tilt-rotor aircraft, but accelerated the production schedule for the latter. To reduce technical and schedule risk in theater and national missile defense programs, it recommended an additional approximate $2 billion for the latter. Also, while the QDR proposed that NATO should fill the shortfall in JSTARS capability, DoD has since revisited the JSTARS decision and included funding for up to fifteen aircraft in the fiscal year 2001 President's Budget. See William S. Cohen, "DoD News Briefing," 28 January 2000, <http://www.defenselink.mil/news/Jan2000/t01312000_t0128dwg.html> (cited 12 April 2000), answer 2 (para. 5), question and answer 16, question 23 (para. 1), answer 23 (paras. 1-2); W. Cohen, *Report of the QDR*, 39-48; Gerald Green, "QDR: Deja Vu or Effective Strategy for Ensuring National Security in the Future?" *Journal of Electronic Defense* 20:7 (July 1997): 16-7; The National Defense Panel, "Assessment of the May 1997 Quadrennial Defense Review," *n.d.,* <http://www.defenselink.mil/topstory/ndp_assess.html> (cited 4 April 2000), para. 5 under untitled introduction and para. 7 under "Other Matters to be Considered"; and Public Law 104-201. For Congressional perspectives concerning subsequent BRAC rounds, and the effect 1996 election-year politics had on souring the process, see Representatives James V. Hansen (UT) and Saxby Chambliss (GA), quotes from: U.S. Congress, House National Security Committee, "Holds Hearing on the FY 98 Defense Budget; Washington, DC" (Date: 2/12/97), text from: *FDCH Political Transcripts,* available from: *Congressional Universe* (Online Service), Bethesda, MD: Congressional Information Service.

[45] See Public Law 104-201. For administration resistance, see comment by Senator John McCain, *Hearings Before the Committee on Armed Services*, United States Senate, 105th Congress, 2d Session, 28-29 January 1998 (Washington, DC: GPO), 6. The NDP's membership consisted of: retired general/flag officers; former officials with

NDP cautioned DoD that choosing either the wrong transformation course, or failing to

transform at all, could subject the U.S. "to both strategic and technological surprise." The panel

proposed funding $5-10 billion annually for transformation, either from budget increases, the

revolution in business affairs, or—worst case—cuts in operations and forces.[46]

Most recently, NATO's experience during Operation ALLIED FORCE, while revealing a

growing gap between the military capabilities and doctrinal approaches of the U.S. and its

European allies, only muddied the waters, with arguments still raging regarding the effectiveness

of U.S. high-tech weaponry and hyperwar doctrine.[47] But even without this controversy, are

there other, perhaps deeper, reasons why changes within DoD have been far from revolutionary?

Transformation Derailed: Bureaucratic Politics

The Defense Science Board, a SecDef-appointed advisory group, criticized DoD in a

Congressionally mandated report, saying "while the [board's] Task Force noted that pieces of a

transformation process are in place, it did not find a pervasive sense of urgency." Although

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DoD, State Department, and National Security Council experience; defense analysts; and a chairman, Philip Odeen, with government and defense contractor experience.

[46] The NDP also critiqued: (1) the QDR's reliance on service visions and failure to translate strategy into coherent initiatives; and (2) service plans to acquire so-called legacy systems (a pejorative term). "Legacy system" loosely refers to systems already operational, or new systems that are only incremental improvements on current ones. U.S. Joint Forces Command calls these "partial product improvements." See Gehman, 4. While unarguably a lot of money, $5-10 billion is not a large amount if one is talking about turning DoD on its collective head. For summaries of the NDP's perspectives, see NDP, *Transforming*, i-vii [quote on p. iv]; NDP, "Assessment," paras. 1-22; James R. Blaker and Steven J. Nider, *America's 21st Century Defense: National Defense Panel Findings Look Forward, Not Back*, Defense Working Group Policy Brief (Washington, DC: Progressive Policy Institute, 1997); Gerald Green, "NDP Calls Simultaneous Two-War Scenario 'Unlikely'," *Journal of Electronic Defense* 21:1 (January 1998): 15-6. For SecDef's rebuttal, see Cohen to Thurmond, 4.

[47] This recent conflict has provided enormous grist for the mill of educated (and sometimes uneducated) opinion. For representative views of aerospace power's effects, both positive and negative, see Earl H. Tilford, Jr., "Operation Allied Force and the Role of Air Power," *Parameters* 29:4 (Winter 1999-2000): 24-38; Ivo H. Daalder and Michael E. O'Hanlon, "Unlearning the Lessons of Kosovo," *Foreign Policy* 116 (Fall 1999): 128-40; Jonathan Foreman, "The Casualty Myth: Americans Can Stand the Sight of Blood," *National Review*, 3 May 1999, 40-1; Wesley K. Clark, "When Force is Necessary: NATO's Military Response to the Kosovo Crisis," *NATO Review* 47:2 (Summer 1999): 14-8 (also: updated 30 August 1999, <http://www.nato.int/docu/review/1999/9902-03.htm> (cited 12 April 2000) [note: web page shows wrong volume number for this article]). For the alliance capabilities gap, see

praising the sheer number of transformation-related activities being conducted, the report

critiqued the absence of an overarching strategy for change, the near-term focus of many

initiatives, the lack of viable metrics for gauging progress, limited budgetary response to

initiatives, and diffuse levels of leadership commitment to the cause.[48] Why has this been the

case, despite a consensual joint vision, seemingly supportive service visions, and powerful

advocates like Admiral Owens? The answer lies in the realities of institutional factors and

operational commitments.

The U.S. defense establishment is an excruciatingly complex bureaucracy where, in

Newtonian fashion, most initiatives find themselves opposed by equal and opposite forces.

Hence, the RMA has run aground on the shoals of inertia. While some resistance has been

deliberate, circumstance or inherent factors in the decision-making structure have also played a

role in developing friction.

In its closing shot, the *GWAPS* asserted, "The ingredients for a transformation of war

may well have become visible in the Gulf War, but if a revolution is to occur someone will have

to make it."[49] A blow to the cause occurred in September 1995, when Admiral Owens

announced his retirement after only one term as VCJCS to take a position as vice-chairman of

Science Applications International Corporation. His departure left a valid question: Despite

occupying the second highest uniformed position within the military, had he been powerful

enough to pull off the RMA?[50]

Report to Congress: Kosovo/Operation Allied Force After-Action Report (Washington, DC: Department of Defense, 2000), xix, 24-7, 127-8.

[48] While generally supporting *JV 2010*, the DSB argues it is insufficient because it does not capture the business side of DoD. See *Report of the Defense Science Board*, 7-30 [quote on p. 15].

[49] Keaney and Cohen, 247, 251.

[50] After his announcement, previously latent resistance began to bubble up. For example, an elaborate display of a notional mobile offshore base discreetly disappeared from public view in the Pentagon. See "Departure Signs," *Aerospace Daily*, 13 November 1995, 244. Some experts did not think Owens was able to make much headway.

The answer is that he probably was not. A main reason is the services, which still control the lion's share of the acquisition accounts, have been lukewarm to Owens' vision of the RMA. Reduced defense budgets in the post-Cold War era, leading to a so-called procurement holiday, have exacerbated this phenomenon. Hence, the services have employed a selective approach to technological innovation, appearing to resist systems deviating too far from their accepted mainstream, or offering perhaps what they saw as capabilities with limited applicability (even if they were potentially important ones).

Examples of rejected innovations include the arsenal ship and the Armored Gun System. Critics argued these systems had high potential for achieving *JV 2010's* goal of massed effects, yet they were canceled by the Navy and Army, respectively. For its part, the Air Force has seemed ambivalent about using anything other than manned, air-breathing platforms for offensive strikes, with ballistic missiles being an obvious, but untenable, exception. Conversely, the Air Force has staked huge political capital on the advanced F-22 fighter and the Navy wants the F/A-18E/F (primarily as a hedge in case the Joint Strike Fighter fails to meet schedule or performance expectations), along with new aircraft carrier and destroyer classes.[51] The Army has a somewhat different challenge, as it is wrestling to fit weapons like the Crusader artillery system into Chief of Staff General Eric Shinseki's new vision of lighter and leaner ground forces.[52]

For example, see Dr. James Schlesinger, *Hearings Before the Committee on Armed Services*, United States Senate, 105th Congress, 2d Session, 28-29 January 1998 (Washington, DC: GPO), 79-80.

[51] The phenomenon of service resistance to externally imposed change is not new, as Robert McNamara discovered when trying to forge wholesale revisions to nuclear strategy in the early 1960s. See Michael Mandelbaum, *The Nuclear Question: The United States and Nuclear Weapons, 1946-1976* (New York: Cambridge Univ. Press, 1979), 81-4. For other critiques, see Blaker, *Vanguard*, 7-8; Tilford, *Revolution*, 8-10; Katherine McIntire Peters, "The Right Stuff," *Government Executive* 31:12 (December 1999): 28-34; Shalikashvili, *JV 2010*, 18; and Conley, 66.

[52] Crusader is an interesting story. I thank my colleague, U.S. Army COL Tim Hoffman, for his help in getting background information. The Crusader has received criticism for being a 100+ ton Leviathan, but weight has not been an important parameter throughout its history (it is still in development). The Army believes Crusader can achieve massed effects without massing forces, thereby fitting the *JV 2010* model. The system consists of a self-propelled howitzer and an accompanying resupply vehicle that is either wheeled or tracked, depending on the mission. While at one point the combined weight of the vehicles grew to the 110 ton range, the program managers now are requiring the howitzer to be in the 38-42 ton range, with the resupply vehicle at 38 tons (tracked) or 31 tons

In fairness, the Army has proactively pushed transformation, as both its *Force XXI* and *Army After Next* initiatives show. The Air Force has certainly embraced all three elements of the RMA, while still maintaining a preference for manned—some would say manned *fighter*—aircraft.[53] On the other hand, the sea services have not appeared to embrace transformation as readily. This may in part be because the RMA's combat focus dovetails with the idea that Army and Air Force forces are sized against the notional two-MTW construct, while Navy and Marine forces are sized primarily by the requirements of overseas presence, a "here and now" concern. An additional rationale may be the Marines' Clausewitzian emphasis on the immutable nature of warfare instead of the ephemeral nature of specific technologies.[54]

However, it may be overly simplistic to speak in terms of service preferences, as the defense establishment has mafias within mafias.[55] Below the macro level of executive and legislative branch dispute, there is civilian/military disagreement within DoD and, of course, interservice rivalry. Peeling the onion back some more, there are also important intra-service rivalries, e.g., fighter pilots vs. heavy drivers vs. space operators in the Air Force; surface warfare officers vs. submariners vs. aviators (complete with shoe shade distinctions) in the Navy; and heavy vs. light advocates in the Army. At a further level of Balkanization, arguments ensue

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(wheeled), for a total range of 69-80 tons for the system. This will allow the Army to load two howitzers in a C-5 aircraft, but reaching the weight goal with other performance parameters intact will be a challenge. See MAJ John D. Wason, U.S. Army (SFAE-GCSSS-CR), personal e-mail, 12 April 2000 (copy provided on request). For the Army vision, see Eric K. Shinseki, "The Army Vision: Soldiers On Point for the Nation…Persuasive in Peace, Invincible in War," c. 12 October 1999, <http://www.hqda.army.mil/ocsa/vision.htm> (cited 12 April 2000); Neil Baumgardner, "Army Seeks to Revise Budget to Reflect Vision Statement," *Defense Daily*, 12 November 1999, 1. For additional discussion on reducing Crusader's weight, see Neil Baumgardner, "Pentagon Approves Army Vision Budget, Restructures Crusader," *Defense Daily*, 4 January 2000, 1, and Neil Baumgardner, "Crusader Redesign to Be Complete by September," *Defense Daily*, 23 February 2000, 1.

[53] Tilford, *Revolution*, 3-6, 8-10. The subject of service culture and affinity for technology is a rich one. See Murray, "Military Culture," 22-3. For descriptions of service cultures in general, see Carl H. Builder, *The Masks of War: American Military Styles in Strategy and Analysis* (Baltimore: Johns Hopkins Univ. Press, 1989). For critiques of the Air Force's historical approach to warfare, see Barry D. Watts, *The Foundations of US Air Doctrine: The Problem of Friction in War* (Maxwell Air Force Base, AL: Air Univ. Press, 1984), and Earl H. Tilford, Jr., *Setup: What the Air Force Did in Vietnam and Why* (Maxwell Air Force Base, AL: Air Univ. Press, 1991).

between East and West coast people, or those flying various production blocks of the same aircraft type.[56]

Another factor feeding institutional resistance is the difficulty in fielding modern weapons systems. Structural obstacles include DoD's planning, programming, and budgeting system (PPBS), as well as its acquisition process. These came on line during the 1960s, a time of relatively static technological change, a clearly identifiable enemy to plan against, and fairly robust defense budgets, none of which apply today. One study revealed it took on average fifty-six months from flight of a first prototype to minimum operational capability for four modern U.S. Air Force fighters (the F-15, F-15E, F-16A, and F-117A). Add to this another thirty or so months to achieve a more robust and reliable combat capability, and you have a process easily taking over seven years, not counting time spent in initial research, development, and design. In fact, DoD's current goal for the process is just over eight years, down from 132 months in 1992! Using Moore's Law, wherein computer processor capabilities double roughly every eighteen months, by the time advanced weapons systems hit the ramp, ground, or water, their onboard computers may be less than 1/25 as fast as state of the art.[57]

A number of additional problems flow from this lengthy acquisition process. For one, the world does not remain static while DoD develops systems. Thus, by the time systems are ready

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[54] The Marines capstone doctrinal document reads like a synopsis of *On War*. See Marine Corps Doctrine Publication 1, *Warfighting* (Washington, DC: Headquarters, U.S. Marine Corps, 1997), 3-26, 33-49.

[55] Meant in a communal/fraternal sense, *not* in a criminal or nefarious sense.

[56] This fractionation may not be a bad thing (see below). For a more detailed description of this phenomenon, see Rosen, *Winning*, 18-21.

[57] On DoD's internal processes, see Office of Management and Budget, *Budget of the United States Government: Fiscal Year 2001* (Washington, DC: GPO, 2000), 174; Office of Management and Budget, *Budget of the United States Government: Fiscal Year 2000* (Washington, DC: GPO, 1999), 170; K. Peters, 28-34; Conley, 65-7; Krepinevich, 38; and NDP, "Assessment," para. 5 under "Principal Observations & Recommendations." For an analysis of how long it takes to achieve viable systems, see Donald Vazquez, *Build-to-Shelve Protoyping: Undercutting Doctrinal Development,* Thesis, School of Advanced Airpower Studies 1993 (Maxwell AFB, AL: Air Univ. Press, 1995), 18-20. Finally, Gordon Moore, co-founder of Intel Corp., articulated his notion in 1965. While not a law in a physical sense, it is hugely powerful nonetheless. For a discussion of how businesses cope with fast-

for fielding, requirements will almost certainly have changed. Changes in requirements in turn drive cost overruns.[58]

Another difficulty occurs when big-ticket systems face cancellation after a long time in development. Here, a service may have staked a significant amount of political and fiscal equity in the system's success, to the point where it may have long since discarded alternatives. In this instance, cancellation at a late date may leave the service with nothing comparable in the pipeline to meet requirements, if DoD still believes the requirements to be valid.

A related effect is that weapon systems tend to generate a deep, long-term commitment to their success among those who nurture them through the Byzantine advocacy processes within DoD. Yet that is only a prelude to the annual funding fight on Capitol Hill, where the battle is really joined.

The House (Appropriations Committee's) Defense Subcommittee's decision to cut F-22 funding in August 1999 emphatically illuminated these issues. The decision was the equivalent of a bureaucratic nuclear strike against the Air Force. The Air Force's consternation was understandable, since large amounts of weapon system funding are front-loaded for research and development, prototyping, plant infrastructure, and so forth. Thus, sunk costs can become very significant long before the first production system is delivered to DoD. In any case, institutional infighting only serves to deepen service ties to specific systems.

The F-22 case highlights Congress' acute awareness of DoD's bureaucratic politics. As a counter, in 1998 they moved to create a powerful uniformed joint experimentation chief at the

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changing markets, see Kathleen M. Eisenhardt and Shona L. Brown, "Time Pacing: Competing in Markets that Won't Stand Still," *Harvard Business Review* 76:2 (March-April 1998): 59-69.

[58] Rosen, *Winning*, 50-1. Rosen suggests "strategies for managing uncertainty" (pp. 221-50) to cope with this problem. This is also part of the Crusader issue, inasmuch as weight has not been a key performance parameter (also called a Tier I requirement) for the system, and was number 10 of 11 among Tier II requirements until recently. Now weight is getting more attention because of the Chief of Staff's guidance, but it is still not a Tier I requirement. See Wason, personal e-mail (cited above).

four-star level to force the services to transform. While SecDef Cohen and CJCS General Henry

Shelton initially persuaded Congress to let DoD work the issue internally—they assigned the

mission of joint integration and experimentation to U.S. Atlantic Command—they eventually did

what Congress wanted: on 1 October 1999, they recast U.S. Atlantic Command as U.S. Joint

Forces Command (USJFCOM), whose "mission is to control the process to transform those

forces [from all four services] into the military we will need in the future."[59]

Yet, some in Congress remain skeptical about DoD's commitment to transformation.

According to Senator Pat Roberts, chairman of the Senate Armed Services Committee's

Emerging Threats and Capabilities Subcommittee,

> I continue to be very concerned about the transformation process within the Department
> of Defense. I do not see how the process currently in place promotes and supports the
> level of meaningful change necessary to meet the challenges of the 21st century. What I
> do see is an environment in which service "stovepipe" systems continue to focus on a
> range of service-unique issues at the expense of joint warfighting lessons learned.[60]

However, while mandating more innovation, Congressmen also fight to preserve ongoing

programs in their states or districts. Examples include the Missouri delegation's bipartisan

support for the F/A-18E/F and the F-15 due to their impact on Boeing's St. Louis operations.

According to a spokesperson for House Minority Leader Richard Gephardt, "They [DoD] don't

want F-15s and we do." This, of course, has nothing to do with strategy and everything to do

with politics.[61]

Like DoD, Congress is also fractionated along special-interest lines. During the Cold

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[59] Gehman, 1. For a recap of the issue history behind USJFCOM's creation see Jason Sherman, "Sensible Solution," *Armed Forces Journal International* 135:12 (July 1998): 8-10 and Jason Sherman, "Modest Beginning: Congress Holds the Pentagon's Feet to the Fire Over Joint Experimentation," *Armed Forces Journal International* 137:5 (December 1999): 6-8.

[60] Quoted in Sherman, "Modest Beginning," 6.

[61] Quoted in Philip Dine, "New Fight for Jobs Looms as Administration Again Seeks to Stop Buying St. Louis-Built F-15s: Congressional Delegation Will Oppose White House," *St. Louis Post-Dispatch,* 3 February 2000, A1. Also see Stan Crock, "The (Not So) Super Hornet," *Business Week,* 13 December 1999, 134, and Conley, 67.

War, service chiefs at times sought strategic redress in Congress after a tactical setback in the

Pentagon, in essence going around CJCS or SecDef. While the 1986 Goldwater-Nichols Act has

virtually eliminated this practice, many Congressional members have affinities for particular

elements or causes within DoD. For example, the House of Representatives web site lists the

following caucuses: Air Power, Army, Aerospace, Coast Guard, National Guard and Reserve

Components, National Security, and Naval Warfare. They also have a Peace Accord Monitoring

Group and Congressional Member Organization on Terrorism and Unconventional Warfare,

along with a smorgasbord of caucuses covering fifteen foreign nations and regions.[62]

Transformation Derailed: Operational Requirements

Hand in glove with institutional resistance, the pull of operational requirements has been

instrumental in creating friction for the transformation cause. The post-Cold War period has

been perhaps the busiest ever for the U.S. military. The U.S. has variously been called the

world's lone/sole superpower, policeman, indispensable nation, and so on.[63] Despite force

structure reductions of over 33 percent, U.S. use of the military as a policy tool of first resort has

been "exponentially greater than that of the Cold War era." For example, the U.S. employed its

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[62] The Goldwater-Nichols Act fostered perhaps the most sweeping changes affecting DoD since the National Security Act of 1947, among them giving CJCS unequivocal primacy over the rest of the JCS. For how services could do end runs during the Cold War, see Mandelbaum, 81-2. In his time as Army Chief of Staff, General Maxwell Taylor described his personal conundrum between maintaining loyalty to his direct superiors and making Congress aware of important dissenting views. While choosing personally both to maintain loyalty (the alternative would be to resign) and answer questions truthfully, he did the latter when called to testify before Congress. See Maxwell D. Taylor, *The Uncertain Trumpet* (New York: Harper & Brothers, 1959), 73-9, 111-14. For Congressional Member Organizations, see "Member Organizations," updated 14 February 2000, <http://www.house.gov/cha/organizations/CMOs/body_cmos.html> (cited 6 March 00). The regions covered are Africa, Albania, Armenia, Asia-Pacific, the Baltics, Europe, Hellenic issues, Hispanic issues, India and Indian-Americans, Nigeria, Norway, Pakistan-Kashmir, Sri Lanka, the former Soviet Union, and Ukraine.
[63] While probably not the first to use the phrase, former CJCS General Colin Powell notably referred to the U.S. as the world's "sole superpower" in *Foreign Affairs*. See Colin L. Powell, "U.S. Forces: Challenges Ahead," *Foreign Affairs* 71:5 (Winter 1992/93): 32. In a 1996 speech, President Clinton referred to the U.S. as the "indispensable nation" while in the same paragraph asserting "we cannot become its [the world's] policemen". See William J. Clinton, "American Security in a Changing World," Remarks at George Washington University, Washington, DC, 5

military in forty-eight overseas missions in the 1990s, compared to "only 20 such missions in the 15 years between the U.S. exit from Vietnam and the Cold War's end." Ten of these operations have been against Iraq, and the Gulf region today features five ongoing operations requiring large numbers of deployed forces. Another fifteen operations have occurred or are ongoing in the Balkans. Not only are there a lot more missions, but they have required tremendous versatility on the part of U.S. troops, who now must be able to conduct peacekeeping, humanitarian intervention, and natural disaster relief in addition to conventional warfighting. Total cost of these operations in fiscal terms was $30 billion, but this does not account completely for less tangible costs in readiness and personnel retention.[64]

As it has turned out, the BUR did not address these requirements adequately and the QDR cut too deeply for the level of commitments. In September 1998, the Joint Chiefs testified to the mismatch between resources and requirements, raising Congressional consciousness to the effects of high operations tempo on service members. Although flavored by election-year posturing (no one wants to be accused of being soft on defense), today's trend is toward more, not less, defense spending. Gone are the QDR's $250 billion budgetary ceilings, with toplines closer to $290-300 billion in the offing, but this still may not be enough. The President proposed an extra $112 billion across fiscal years 2000-2005 for "readiness, modernization, and other high priority defense requirements," yet readiness remains an administration concern. The QDR's ramp-up to $60 billion in modernization accounts by 2001 will likely occur, more QDR reductions may be reversed, and new studies are even proposing force structure increases.[65]

August 1996, reprinted in *Dispatch,* 5 August 1996, 402. Secretary of State Madelaine Albright also uses this term frequently in public addresses.

[64] Dubik, 5 [first quote]; Scarborough, A6 [second quote, plus data].

[65] For an early critique on readiness, see Krepinevich, 28-32. The four service chiefs and the CJCS testified on the higher than expected tempo and its effect on readiness. Other experts have testified as well. For representative comments, see General Henry Shelton, U.S. Congress, Hearing of the Senate Armed Services Committee, "Status of the U.S. Military Forces" (Date: 9/29/98), text from: *Federal Information Systems Corporation Federal News*

The U.S. defense establishment has not had the luxury of a pause to allow transformation. Instead, it has had to handle one crisis after another since the Gulf War. In the words of SecDef William S. Cohen, "You have to balance present against future." This reiterates his major contention with the NDP findings—he supports transformation, but has had to face a real world of unaccommodating situations.[66]

Such hedging is also evident in recent DoD decisions on modernization. For example, SecDef has carefully balanced competing tactical air programs (the F-22, F/A-18E/F, and the Joint Strike Fighter), investing in each to hedge against the risk that any of them will not meet performance or acquisition goals. *JV 2010* supported this approach by saying, "we must ensure that capturing the new technologies does not overspecialize the force; **we must retain balanced and sustainable capabilities.**" Maintaining readiness for near-term "knowns" and longer-term "unknowns" will require a constant budgetary juggling act.[67]

Service, available from: *Congressional Universe* (Online Service), Bethesda, MD: Congressional Information Service, and Schlesinger, *Hearings Before the Committee on Armed Services,* 64, 74, 82-4. For budget trends, see W. Cohen, *Report of the QDR,* 59-63, 67; William S. Cohen, "No Shortchanging Defense," *Washington Post,* 27 January 2000, A27; *A National Security Strategy for a New Century* (Washington, DC: The White House, 1999), iii (quote); and George C. Wilson, "Both Parties to Boost Military Health Care," *The National Journal,* 22 January 2000, 234-5. In his last Senate testimony before leaving public office, Dr. John Hamre noted "there's nothing magic about $60 billion" and said it would take "$10 (billion) to $15 billion more a year [than $60 billion] for procurement in order to start getting out of that hole" caused by the procurement holiday in the 1990s. See John Hamre (Deputy Secretary of Defense), quoted in: "Hearing of the Defense Subcommittee of the Senate Appropriations Committee," subject: Fiscal Year 2000 Defense Appropriations (Date: 3/6/00), text from: *Federal Document Clearing House Congressional Testimony,* available from: *Congressional Universe* (Online Service), Bethesda, MD: Congressional Information Service. In addition to the Joint Staff submarine study cited earlier, a press report talked of a Navy study advocating increasing surface combatant force from the QDR-mandated 116 ships to 138. A neutral Congressional Budget Office study has been used by various Washington insiders to show movement toward force structure additions. Initiatives cited in the media include boosting the attack submarine force, the Army's force structure by around 20,000 soldiers to allow for specially dedicated peacekeeping units, and the number of aircraft carrier battle groups to fourteen. See Congressional Budget Office, *Budget Options for National Defense: A CBO Report* (Washington, DC: Congressional Budget Office, 2000), 7-24. For media spin, see Robert Holzer, "U.S. Navy Hopes to Expand Fleet," *Defense News,* 31 January 2000, 1; Neil Baumgardner, "350 Ships Not a Magic Number, Danzig Says," *Defense Daily,* 24 March 2000, 1; and Rick Maze, "Congressional Report Says Missions May Require 20,0000 More Soldiers," *Army Times,* 31 January 2000, 9. These reports are illustrative of the trends, not definitive.

[66] See Cohen to Thurmond, 1, 5. Quote in Paul Mann, "Cohen Defends Pentagon Reforms," *Aviation Week & Space Technology,* 6 December 1999, 62. See also *National Security Strategy,* 20-1; Conley, 64; and Statement of Schlesinger, *Hearings Before the Committee on Armed Services,* 66.

[67] Mann, 62; Shalikashvili, *JV 2010,* 27, 33 [quote on p. 27, emphasis in original].

Hedging has led DoD to retain the two-MTW construct despite abundant criticism. According to SecDef Cohen, challenges to U.S. interests from aberrant regimes on the Korean Peninsula and in Southwest Asia remain real, so the planning construct could conceivably have a real-life counterpart.[68] Critiques of DoD fall into two categories: disputing the viability of the construct itself, or citing its resource shortfalls. As we have seen, the NDP emphasized the former and at least one study (described above) argued that, with technological enhancements and increased multilateral support, the U.S. could reduce its force structure and defense budgets by 20-30 percent, albeit at some risk. The latter issue of the strategic "eyes" being too big for the budgetary "stomach" has been raised repeatedly by Congress since the BUR. Thus, the last decade has seen the U.S. armed forces spread extremely thin.[69]

Overall, the hedgers make some compelling arguments. Many transformers cite the interwar years as a lodestar, as this was a time of great doctrinal ferment. Admiral Owens, in a recent article, described this as an era when "standing military forces were encouraged to work out new ways of doing things and given the resources and freedom to do so."[70]

This perspective belies a reality of penury as the real mother of invention and severe career risks for innovators. Notable cases of the latter included Billy Mitchell's career immolation over airpower and the highly circumspect (and illegal) activities of the 1920s German *Reichswehr* under Hans von Seeckt. It also ignores the fierce intra-service battles for resources and legitimacy waged by U.S. Army Air Corps strategic bombing advocates, Navy

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[68] In a recent talk at Harvard University, a senior military officer joked that he has been hearing of the imminent collapse of the North Korean regime since he was a lieutenant thirty years ago, and he's still waiting. For SecDef's view, see Cohen to Thurmond, 4.

[69] For an alternative force structure, see Conetta and Knight, 2-3, 24-54. For Congressional perspectives, see Spence Statements, *Quadrennial Defense Review Hearings*, 114, 280; Senator Max Cleland (GA) and Dr. James Schlesinger, *Hearings Before the Committee on Armed Services*, United States Senate, 105th Congress, 2d Session, 28-29 January 1998 (Washington, DC: GPO), 10, 83. A critique of the two-MTW approach was at the heart of the NDP's charter in Public Law 104-201.

[70] W. Owens, "Revolutionizing," 24-6 (quote on p. 26).

carrier devotees, Army tankers, and Marine amphibious warfare developers. When RMA advocates cite these examples, they also seem to forget the innovators who developed these concepts operated under benign neglect from an isolationist government, not as an instrument of first resort for a superpower that "regards all the outside world as its sphere of influence."[71] But, while U.S. global activism has been the case for the last decade, will it remain so for the future?

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[71] Statement of Dr. James Schlesinger, *Hearings Before the Committee on Armed Services*, 68 (quote). Also see Tilford, *Revolution*, 2, 11-2, and Murray, "Military Culture," 19-21. Tilford says "poverty is the father of ingenuity" (p. 11). Professor Stephen P. Rosen argues that the most important factors governing peacetime military innovation are "talented military personnel, time, and information." See Rosen, *Winning*, 252.

WHEN DRIVING IN THE FOG...: THE VEIL OF UNCERTAINTY

DoD finds itself today on the horns of a dilemma. While the pace of information-driven change proceeds relentlessly, real-world commitments threaten to engulf U.S. forces. A unified vision for change exists—and a decade has gone by since the Gulf War first promised a new vision of warfare—yet change has been more evolutionary than revolutionary. The central issue for DoD is whether to transform, and, if so, at what pace. A crucial assumption is the American people will only be willing to pay for one type of force structure, regardless of budget surpluses. It will be a tough fight for "guns and butter," an impossible one for "two guns and butter."[72] In such a case, a strategist would rationally start planning by looking to the future.

Unfortunately, forecasts offer little help. The future is highly uncertain, and even near-term prognosticating can be hazardous. For example, in late 1997, James Blaker asserted "the chances of engaging in such an undertaking [an MTW on the Gulf War scale] in the next five years certainly seem lower now than earlier."[73] Yet, less than eighteen months later, the U.S. found itself in just such a conflict—certainly the U.S. Air Force did—over the Balkans.

The picture gets even fuzzier the further out one looks. Through 2025, assessments posit myriad, but nebulous, threats to U.S. interests, including potentially hostile coalitions of adversaries, although there is a strong consensus against the emergence of a global peer competitor like the former Soviet Union. The world is likely to see an increase in the number and violence of conflicts—some shocking to U.S. sensibilities—generating an ever-greater

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[72] For a discussion of funding assumptions, see Krepinevich, 17; Henry H. Shelton, "Operationalizing Joint Vision 2010," *Airpower Journal* (Fall 1998): 106-7; and Shalikashvili, *JV 2010*, 32-3. The idea that we already spend enough or too much on defense was a central theme of a November 1999 symposium entitled "Ten Years After the Wall: Trends in Post-Cold War U.S. Security Policy," sponsored by the Project on Defense Alternatives in Cambridge, MA.

[73] Blaker, *Vanguard*, 8. To his credit, immediately preceding this statement Blaker does say "it is always dangerous to write off the possibility of what the Pentagon now calls a 'major theater war.'"

impetus for U.S. engagement. States and non-state actors will be at varying stages of development, with diverse interests. State atomization and border adjustments will likely continue, and the aims and fighting here will be territorial, rendering presumptuous early post-Cold War prognoses hailing the "decline of dirt." Such conflicts will probably impel humanitarian interventions, with the U.S. pressured to "do something." The U.S. may also see attacks against its homeland, heretofore a virtual sanctuary, perhaps with weapons of mass destruction.[74]

These trends seem to buttress the arguments of hedgers over transformers. Historian and analyst Williamson Murray argues that previous twentieth century RMAs were focused responses to palpable threats. Conversely, Professor Stephen Peter Rosen argues that "intelligence about the behavior and capabilities of the enemy has been only loosely connected to *American* military innovation."[75]

In any case, the current RMA is at best oriented against diffuse, even ephemeral, opponents, and guessing wrong about warfighting doctrine could critically impair future U.S. influence in the world. In the hedger's view, the only constant will be constant surprise, and this is certainly something the U.S. has proved particularly vulnerable to over the last half century.[76] Examples include Pearl Harbor in 1941, North Korea's attack in 1950, the Tet offensive in 1968, and Iraq's thrust into Kuwait in 1990.

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[74] Japanese balloons, Pancho Villa's raids, and The War of 1812 notwithstanding. For assessments, see W. Cohen, *Report of the QDR*, 3-5; The United States Commission on National Security/21st Century, "New World Coming: American Security in the 21st Century, Major Themes and Implications," 15 September 1999, <http://www.nssg.gov/Reports/New_World_Coming/new_world_coming.htm> (cited 12 April 2000), 2-6, 8; Hans Binnendijk and Richard Kugler, eds., *Strategic Assessment 1999: Priorities for a Turbulent World* (Washington, DC: GPO, 1999), vii, xi-xx. Also see Fitzsimonds and van Tol, 29, and van Riper and Scales, 16, 18-20.

[75] Murray cited in Jason Sherman, "Looking Forward: How the Rest of the World is Responding to the RMA," *Armed Forces Journal International* 137:5 (December 1999): 20. Also see, Rosen, *Winning*, 253 [emphasis added, as Rosen indicates this may not be the case for other countries].

[76] See The United States Commission on National Security/21st Century, 6; Schlesinger, *Hearings Before the Committee on Armed Services*, 72; and Blank, 27-8 (cited with permission of the author). In future warfare, the

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On the other hand, transformers offer powerful arguments for action. The first is the notion that, by delaying transformation, the U.S. will incur ever-steeper costs in lost opportunities. Transformers believe the world is on the crest of a technological tsunami, yet the U.S. has wasted over a decade dithering. Meanwhile, information technologies previously monopolized by the U.S. military, like satellite imaging and global telecommunications, have become widely available commercially, giving potential U.S. adversaries access to significant capabilities.[77]

While it would be suicidal for most adversaries to compete with the U.S. symmetrically, modern technologies offer niche opportunities for many. Thus, the argument goes, the U.S. desperately needs to leverage whatever edge it has left. DoD, for its part, needs to "Change or Perish [sic]" according to the Defense Science Board, which, while strongly urging institutional tolerance and support for transformation adherents, also proselytizes: "Those who resist must be converted or moved out of the way."[78]

A second argument for change concerns the longevity of modern military platforms. All one need do is look at present legacy systems. Air Force bombers and tankers like the B-52 and KC-135 will last up to seventy years on average. Front-line combat aircraft like the F-15 are pushing fleet average ages of twenty years in fiscal year 2000, with an expected maximum

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problem may be exacerbated because, as Professor Blank points out, when it comes to "cyberwar" one may not know for some time that one has been attacked.

[77] In a chapter of *War and Anti-War* entitled "The Knowledge Warriors," the Tofflers noted that the information revolution has reversed the traditional flow of technology from the military to the civilian sector in the U.S. Admiral Owens has been emphatic about the need to act on the RMA. See W. Owens, *Hearings Before the Committee on Armed Services*, 39.

[78] Numerous sources support these ideas. See *Report of the Defense Science Board*, 5, 18-9, 27 [quotes on pp. 5 and 19]; Fitzsimonds and van Tol, 28-9; Binnendijk and Kugler, xv, xix; E. Cohen, A18; W. Owens, "Revolutionizing," 26-7; Institute for National Strategic Studies, "The Revolution in Military Affairs," *Strategic Forum* 11 (November 1994): 2; and Blaker, "American RMA Force," 21-30. Dr. Blaker is a close associate of Admiral Owens, serving as a Senior Advisor to the VCJCS from 1994-96. He also moved with the admiral to Science Applications International Corporation when the latter retired from the Navy. Blaker's article cited here is long on ideas, but short on citation. His main source is "a series of informal seminars at the National Defense University conducted

service life of thirty years. Aircraft carriers last upwards of forty years service life. The systems we select now, especially major weapons systems, will be with us, albeit with modifications, for a good part of this century. Thus, we need to think about warfare twenty or more years out right now.[79]

As a counterpoint to this urgency argument, the U.S. could take advantage of the same commercially available technology discussed above and enter the fight later. In a developmental generation or two, the military effectiveness of various technologies will perhaps be clearer, unless the pace of technological change continues to accelerate. To use a simplistic analogy, if you owned a 1985-era personal computer, you could trash it and upgrade to state of the art without having to purchase all the intermediate iterations. Of course, anyone who has purchased a personal computer in the last decade also knows something about strategic self-paralysis: Do you remember wondering when and what to buy? Writ large, a wait and see approach would require more flexible budgeting and acquisition processes than DoD has in place. Plus, the U.S. would need a respite from significant strategic challenges.

So, since strategic assessments are at best inconclusive, where should we turn for more definitive insights? I suggest we begin by looking at the potential effects of transformation on U.S. foreign policy, where alliances and coalitions have become the norm for U.S. military operations.

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from May 1996 until February 1997" [fn. 1]. While he tells us where he got his force structure and cost data, he does not explicitly articulate the underlying assumptions for his proposal.

[79] Fitzsimonds and van Tol, 28-9. For representative service lives and average ages of weapons systems, see Congressional Budget Office, 26 [Table 2]. Using a cyberspace analogy, imagine trying to manage in the world today with a Commodore VIC-64!

...IT HELPS TO HAVE FRIENDS: EFFECTS ON U.S. FOREIGN POLICY

To the extent they allow the U.S. to form effective military alliances and coalitions, force structure and doctrine can positively influence foreign policy. While there are several ways a U.S.-led RMA could enhance relationships with its allies and partners, there are also significant detriments to pursuing transformation in a different way, or at a faster pace, than its friends.

A fundamental assumption behind this argument is that multilateral support will continue to be a basis for U.S. action. Such support may be especially needed for legally contentious operations, e.g., humanitarian interventions impelled by intrastate conflict. The importance of alliances and coalitions is inversely proportional to the level of U.S. interest, unless preserving the alliance itself is an interest, as in the case of NATO.

While not ruling out unilateral operations, official U.S. documents cite a high likelihood of engaging militarily as part of an alliance or coalition in the future, so interoperability will remain crucial. The *QDR Report* had a heavy coalition/alliance bias, substantively discussing them over twenty-five times, while mentioning a fallback unilateral capability in only four instances. The report weighted the political utility of coalitions and alliances over their military utility, to the point of negative synergy, i.e., a whole less than the sum of the parts. Even more telling, the QDR's analysis of U.S. capabilities to fight two nearly simultaneous MTWs—the most stressful scenario—assumed these would be conducted with allies or partners.[80]

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[80] W. Cohen, *Report of the QDR*, 8-14, 23-4 (word counts conducted on Web version of report at http://www.defenselink.mil/pubs/qdr/). Also see Shalikashvili, *JV 2010*, 4, 7, 9, 31; *National Security Strategy*, iv, 1, 3; Ashton B. Carter, William J. Perry, and John D. Steinbrunner, *A New Concept of Cooperative Security*, Brookings Occasional Paper (Washington, DC: Brookings Institution, 1992), 5, 26-7; Bronson and Goure, 29-30.

When Dealing with Friends, the Devil's in the Details

Transformers see technology as enhancing U.S. alliance- and coalition-building efforts. Their primary good is information. In addition to providing a potentially dominant advantage in warfighting, information can also enhance transparency of confidence-building measures with potential adversaries, enforcement of arms control agreements, compliance with environmental agreements, responsiveness to humanitarian crises, and other generally stabilizing measures.[81]

Looking internally, sharing information with allies and partners will increase mutual confidence, yielding strengthened partnerships. To transformers, interoperability concerns, while important, are exaggerated, with U.S. forces experienced at operating with partners of varying degrees of advancement. Using a cyberspace metaphor, one analyst likened the U.S. to a user of the latest version of a software product and its partners to users of earlier versions of the software, with the U.S. easily subsuming the archaic forms under its operating system.[82]

If only it was that easy. Hedgers contend that if the U.S. develops vastly different military capabilities from its potential partners, it could severely limit its future policy options. At the operational level, interoperability is the chief concern. At the strategic level, a force structure mismatch could lead to over-reliance on high-tech U.S. forces or divide the partnership over differing perceptions of risk tolerance. A third inhibitor results when military capabilities outpace existing command and control processes.

Interoperability is the cornerstone of alliance/coalition military effectiveness. It is what lets forces fight together. Incompatible equipment and doctrine can thwart interoperability. Unfortunately, this is exactly where the U.S may find itself if it technologically outpaces others

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[81] Bronson and Goure, 25-6.
[82] W. Owens, "Revolutionizing," 26. For the computer metaphor, see Blaker, *Vanguard*, 7. Ironically, the obverse of Blaker's analogy is not true, as anyone who has tried to use an earlier version of software to open a file in later versions of the same software can attest to.

too significantly or too quickly, a concern the QDR articulated.[83]

NATO provides a salient example of this phenomenon. Clearly, the technology gap between U.S. and European militaries has generated significant angst in defense and security circles. By one estimate, Western European countries spend two-thirds of the U.S. total for defense, but get less than a quarter of the deployable fighting strength for it. More germane to transformation, the U.S. invests greater resources in defense research and development, both absolutely and relatively, than the Europeans do.[84]

Motivated partly by politics, the Europeans have taken several important steps to close the gap. Britain's 1998 Strategic Defence Review, with its emphasis on joint operations, C4ISR, precision, and mobility, was a seminal effort to move forward. NATO's unveiling of the Defense Capabilities Initiative (DCI) in April 1999 tracked with the British review, focusing on upgrading mobility, sustainability, survivability, precision engagement, and information systems. December 1999's Helsinki Summit saw the European Union announce a plan to create a 60,000-member rapid reaction force by 2003 as part of the European Security and Defense Policy. However noble they may be, if these efforts flag or duplicate NATO capabilities, it could increase intra-alliance tension, perhaps to the point of fracture.[85]

Operation ALLIED FORCE brought the technology gap into stark relief. The U.S. not

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[83] W. Cohen, *Report of the QDR*, 11, 14.

[84] Peter W. Rodman, "The Fallout from Kosovo," *Foreign Affairs* 78:4 (July-August 1999): 50. Lord George Robertson, current NATO Secretary-General, told reporters in Washington that the numbers were more like 60 percent of U.S. spending to get 10 percent of U.S. capability, although Robertson's emphasis is on smarter spending instead of more spending. See Vago Muradian, "Robertson: Europe Must Spend More Wisely to Achieve Gains," *Defense Daily,* 8 December 1999, 1. For European R&D spending, see Bronson and Goure, 30.

[85] My thanks to one of my European colleagues at Harvard for help and feedback here. See Secretary of State for Defence, *The Strategic Defence Review* (London: The Stationery Office, 1998). For DCI details, see "NATO Press Release NAC-S(99)69: Defense Capabilities Initiative," updated 25 April 1999, <http://www.nato.int/docu/pr/1999/p99s069e.htm> (cited 4 April 2000). For the European Security and Defense Policy, see Secretary of State for Defence, *The Defence White Paper 1999* (London: U.K. Ministry of Defence, 1999), 14 and William Drozdiak, "U.S. Gives Qualified Endorsement to Plan for European Armed Force," *Washington Post*, 16 December 1999, A34. On cooperation, see Sherman, "Looking Forward," 20; and Brian Shannon, "Odeen: U.S., Allies Face Risk Without Cooperation," *Defense Daily*, 24 February 1998, 1.

only flew the overwhelming majority of strike missions, but the conflict highlighted European shortfalls in electronic attack, precision strike, stealth, and C4ISR capabilities. For the latter, NATO had to cobble together *ad hoc* arrangements to allow the international force to communicate internally. Worse, some European aircraft did not have secure communications capability, forcing whole attack formations to operate in the clear. This greatly increased the risk for these strikers (and should not have been necessary). According to former Deputy SecDef John J. Hamre, "It's very clear from the air operations that the allies have not invested in the defense capabilities necessary to fight a modern war the way the United States does it, and the way Western democracies want them fought: with high precision and low collateral damage. That's why [Defense Secretary William S.] Cohen put the marker down at the recent NATO summit that all the European allies need to increase their defense budgets."[86] The challenge is in guaranteeing this occurs.

In addition to operational concerns, a capabilities imbalance generates at least three strategic implications. The first is, the more the U.S. demonstrates it can fight by itself, the more potential partners may just as soon let it. Today, the U.S. keeps fairly robust forces stationed or deployed overseas to support both the responding and shaping functions of its strategy. As the RMA delivers improved power projection and standoff capabilities for responding, the U.S. will be able to reduce its footprint overseas, and shaping may not be a sufficient rationale by itself to sustain a robust overseas presence. Over time, disengagement could reduce U.S. reliance on support from others, and they in turn could become less accustomed to and dependent on U.S. presence. As a result, the U.S. could eventually find it difficult to build coalitions and alliances.[87]

Under a concept called "cooperative security," crafted by former SecDef William J. Perry

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[86] James Kitfield, "A War of Limits," *National Journal*, 24 July 1999, 2159-60 (Dr. Hamre quote on p. 2160). Also see Bronson and Goure, 25 and *Kosovo/Operation Allied Force After-Action Report*, 24-5, 74.

(and others), the U.S. could avert this unintended unilateralism by reducing its aggregate capability, especially in ground and naval forces, to ensure it would have to fight in most instances as part of a coalition. However, this may also have an unintended negative effect, as the second strategic implication is that the U.S. may be unable to sustain a coalition or alliance if the technology gap makes others believe it is not willing to assume its fair share of the risk. In other words, high-tech Americans stay "safe" in the air while their lower-tech allies "muck it out" on the ground. U.S. Marine Lieutenant General Paul van Riper and U.S. Army Major General Robert Scales argue that such a perception began threatening U.S. influence in NATO even before Operation ALLIED FORCE highlighted the technology gap and apparent U.S. preferences in warfighting.[88]

The third strategic implication of accelerated U.S. transformation is pragmatic: command and control requirements, especially for coalition/alliance operations, can nullify the system of systems' advantages. The process for controlling air assets during the Gulf War was an inefficient descendant of World War II methods. Technology and doctrine have improved considerably over the last decade, but still fall short of the system of systems ideal.[89]

However, technical limitations pale when compared to the friction generated by political oversight and the requirement for consensus, perhaps among a large number of actors, e.g., the nineteen-member North Atlantic Council. As NATO's experience in Operation ALLIED FORCE showed, targeting proposals can be subject to intense and time-consuming political

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[87] This issue surfaces again below. See Bronson and Goure, 31-3.

[88] For cooperative security and related ideas, see Carter, Perry, and Steinbrunner, 25-7, and Conetta and Knight, 20-1, 31-3. Conetta and Knight talk of a "division of labor," indicating U.S. forces are best used to provide standoff attack and C4ISR. Also see Bronson and Goure, 30, and van Riper and Scales, 20.

[89] For instance, as recently as late 1998, CJCS critiqued the seventy-two hour air tasking cycle as being too unresponsive to meet the requirements of *JV 2010*. See Shelton, "Operationalizing," 105.

vetting, with all actors getting an equal vote despite unequal risk.[90]

While DoD's after-action report saw NATO's consensus-building process as yielding generally improved decisions, others have been less charitable. According to U.S. Air Force Lieutenant General Michael Short, NATO's top airman during the war, "There were targets that individual nations would not let us hit, or wouldn't let us hit with airplanes launched from their soil." In testimony before the Senate Armed Services Committee, Short got specific, roundly criticizing the French for using their "red card" (veto) to block missions they did not like. In the same hearing, Senator John Warner voiced concerns about NATO's ability to generate quick-response strikes in support of a ground force in a future scenario. The situation seemed quite frustrating at times, highlighting the inefficiency of war by committee, especially in a fluid and complex war. For Boyd aficionados, this meant lengthening the "DA" in "OODA," as Admiral James Ellis (NATO's Commander, Allied Forces Southern Europe) has pointed out. Potential U.S. adversaries almost certainly know it, too.[91]

In essence, transformation's potential effects offer U.S. policy makers a paradox: rather than improving security, the RMA may induce strategic self-paralysis by limiting military options to unpalatable unilateral actions. Additionally, unless political processes or rules of engagement facilitate a system of systems, the U.S. would be making a massive investment in capabilities with limited utility. Taken to a logical extreme, the result could be neo-isolationism

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[90] In NATO's case, the shortfalls have led some experts to call for a comprehensive review of command and control procedures. One initiative would create a Security Council-type body of the more powerful NATO members who would have the authority to endorse military action. See Kitfield, 2158-61. For generic (non-ALLIED FORCE) critiques, see Keaney and Cohen, 247, and Blank, 47 (cited with permission of the author).

[91] DoD does say parallel U.S. and NATO processes complicated planning and execution. Its report also recommends NATO work to improve its political-military coordination. See *Kosovo/Operation Allied Force After-Action Report,* 5, 127. The quote is from Lieutenant General Michael Short, *Frontline* interview, 29 February 2000, <http://www.pbs.org/wgbh/pages/frontline/shows/kosovo/interviews/short.html)> (cited 30 March 00), response to question 28. Senate testimony is from Senator John Warner (VA) and Michael Short, "Lessons Learned From Military Operations and Relief Efforts in Kosovo," Hearing of the Senate Committee on Armed Services (Date: 10/21/99), text from: *Federal News Service,* available from: *Congressional Universe* (Online Service), Bethesda,

brought on by choices in force structure and doctrine.

The Way Ahead

The good news for the U.S. is that there may be a way around these problems. That is, the U.S. could tie changes in its forces and doctrine to related efforts by its key military partners. I would define as "key" those partners most likely to join the U.S. in conducting *robust offensive strikes*, because these operations put a premium on interoperability, shared risk, and effective political control. Britain, France, and Germany are three very good examples of potential key military partners.[92] Synchronization with other potential partners is less important, as they will not likely play a central role in U.S. offensive operations—though they could provide important niche capabilities—or will only find themselves working with the U.S in less technology-dependent operations like peacekeeping.

The U.S. must rely on persuasion to bring its friends along. At day's end, the U.S. has little control over others' internal politics. While there are many optimists among European leaders for the three partners above, the European Union is some way from having a Common Foreign and Security Policy, and defense spending trends do not yet match the rhetoric. For example, Germany's defense spending has dropped to 1.3 percent of gross domestic product (GDP), placing it second from the bottom in NATO. Conversely, using 1998 figures only two NATO countries, Turkey and Greece, outspent the U.S. in relative GDP terms. Perhaps more

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MD: Congressional Information Service. For last two sentences (plus other critiques), see Admiral James O. Ellis, "A View from the Top," unpublished Powerpoint briefing (no date), slide 24.

[92] When I asked Lt Gen (USAF, ret.) Brent Scowcroft, former Assistant to the President for National Security Affairs in the Ford and Bush administrations, this question at The 2000 Harvard Colloquium on International Affairs, he responded that he thought it was a good idea, both from the context of the Combined Joint Task Force and political "coalitions of the willing" embedded in NATO. See Brent Scowcroft, "Keynote Address, Ten Years After the Fall of the Wall: Transition and Transformation in Eastern Europe and the Former Soviet Union," 10 March 2000, <http://www.wcfia.harvard.edu/colloquium/rm/031000_AMES_400_530.ram> (cited 12 April 2000), 00:59:10 to 01:00:47 elapsed (h:m:s) time on Web broadcast. See also Kitfield, 2159.

important than the sheer size of the spending is ensuring these allies spend their scarce resources as smartly as possible.[93] Another concern is the effect intensive cooperation with the U.S. will have on these countries' other multilateral commitments, both politically and operationally.

For its part, the U.S. can keep measures like the DCI in the limelight. On the plus side, the U.K. is closely self-assessing its progress in meeting Strategic Defence Review guidance, identifying strategic lift as the only notable shortfall to date. Furthermore, the U.S. should invite key partners to participate in experimentation, doctrine development, education, and research and development (R&D).[94] None of these measures will be easy due to structural concerns, cultural impediments, and security issues, but this does not negate their utility.

In sum, *the problems transformation poses for U.S. foreign policy are surmountable. If key military partners can agree with the U.S. on the general nature of transformation, then the issue is reduced to one of timing and funding.* The main cautionary for the U.S. is not to transform its military in isolation.

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[93] On current issues and concerns, see Chris Patten, Member of the European Commission responsible for External Relations, "The EU's Evolving Policy Dimension—the CESDP After Helsinki," Speech to Joint Meeting European Parliament Foreign Affairs Committee with Members of the NATO Parliamentary Assembly, 22 February 2000, <http://europa.eu.int/comm/external_relations/speeches/patten/speech_00_51.htm#top> (cited 4 April 2000). For spending data, see The Secretary of State for Defence, *Performance Report 1998/99* (London: U.K. Ministry of Defence, 1999), 29 (Fig. 5). For critiques of spending, see Muradian, 1; Michael A. Taverna, "German Industry Decries Defense Cuts," *Aviation Week & Space Technology,* 28 February 2000, 40-1.

[94] For U.K. self-assessment efforts, see Secretary of State for Defence, *Defence White Paper 1999,* 18-27. For U.S. actions, see NDP, "Assessment," para. 6 under "Other Matters to Be Considered"; *Report of the Defense Science Board,* 22; *Kosovo/Operation Allied Force After-Action Report,* 25, 127; and *National Security Strategy,* 21.

...AND TO KEEP YOUR EYES ON THE ROAD: THE NATURE OF CONFLICT

While forces are the vehicles of strategy, and doctrine their fuel, they do not operate in a strategic vacuum. Friction and fog are always at play. Can technology mitigate the effects of friction and fog, decreasing the incidence and violence of conflict? I say no, especially since the U.S. will be dealing with reactive, smart adversaries. Furthermore, radical transformation could leave the U.S. with insufficient forces to meet anticipated demands over the next few decades. As with foreign policy, both transformers and hedgers can make cogent arguments for their approaches, but in the end the hedgers take the day.

The Allure of Technology

One of the attractions of modern weaponry is its promise of more efficient warfare. Consider this statement from Admiral Owens:

> If America can see...a battlefield the size of Iraq or North Korea, see it in its entirety, see every platform in that platform [sic] and see where it is located plus or minus 10 centimeters, I would not have said that 2 years ago, but today within 10 centimeters, 24 hours a day real time, all weather, *if we can do that and the enemy cannot, we win.*[95]

Again, this peculiarly American brand of technological determinism is suffused with a sense of omniscience and a capacity for near-perfect discrimination. Recent conflicts like the Gulf War and ALLIED FORCE seemed to highlight the efficiency of U.S. military technology.[96]

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[95] W. Owens, *Hearings Before the Committee on Armed Services*, 40 [emphasis added].

[96] Keaney and Cohen, 235-51; *Kosovo/Operation Allied Force After-Action Report,* 79-93. Human Rights Watch, a non-governmental organization, conducted a detailed bomb damage assessment following ALLIED FORCE. In a report sharply critical of NATO's selection of targets, weapons, and methods, they documented ninety incidents of collateral damage, featuring approximately 500 civilian deaths, during the 78-day air war. While there was declaratory intent on NATO's part to minimize civilian casualties, backed up by the highest percentage use of precision-guided munitions ever, Human Rights Watch believes NATO violated international humanitarian law (but did not commit war crimes). See Human Rights Watch, "Civilian Deaths in the NATO Air Campaign," *Human*

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Transformers believe an RMA force could enhance stability in international relations, decreasing the likelihood of conflict and ensuring conflicts are less bloody when they occur. If the U.S. substantially reduces its traditional ground forces, they maintain this would reassure powers concerned about U.S. designs on their territory or sovereignty. Increased use of precision weaponry and non-lethal means of warfare, coupled with information superiority, seem to satisfy traditional "just war" concerns like proportionality and discrimination almost completely, making war more humane. For the side having high-tech forces, massed effects will cut the number of combatants required, and thus aggregate risk. Not only will there be fewer, sharper "teeth," but focused logistics will slash the support "tail," which in turn will further reduce the force's size and overall risk exposure. Finally, for all sides, the RMA ideal promises shorter wars—no more attrition warfare—raising the probability of successful conflict termination and long-term peace.[97]

And then there is Grozny. One need only look at this devastated Chechnyan city to see the RMA's promises, if not chimerical, are dependent on who is fighting where and for what ends. Rather than having a stabilizing effect on international relations, an RMA force may actually increase the likelihood of conflict. This is due to its aforementioned generation of a sense of omniscience and near-perfect discrimination in its holders. As it turns out, these have destabilizing effects.

First, if a party to a conflict believes itself omniscient, it may find preemptive strikes an appealing policy option. In the vernacular, increased confidence may make them more trigger-

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Rights Watch Report 12:1(D), February 2000, <http://www.hrw.org/reports/2000/nato)> (cited 12 April 2000). Contrasted with the Human Rights Watch findings, DoD's report found only one instance of "significant collateral damage" out of thirty-eight sites inspected (p. 84).

[97] For the bloodless war ideal, see Sun Tzu (cited above), and Bronson and Goure, 26-7. Admiral Owens suggests bombs could be reduced to perhaps 50 pounds as U.S. ability to identify and strike targets precisely improves. See W. Owens, *Hearings Before the Committee on Armed Services*, 41. For additional arguments regarding the stabilizing effects of RMA forces, see Blaker, *Understanding*, 8-9, 16.

happy if they sense an impending threat. During the Cold War, the key inhibitor to nuclear preemption was *imperfect* knowledge of the adversary's capabilities. In other words, unless you were sure you were able to destroy the other side's retaliatory capability in a first strike, preemption was too risky. Transformers assert a system of systems would provide a fix for this dilemma, whether striking an adversary's conventional or WMD assets.[98]

James Blaker argues this ability to strike preemptively is a powerful selling point for a U.S. system of systems, and that preemption is particularly effective when a large capability gap exists between the opposing sides. Rachel Bronson and Daniel Goure of the Center for Strategic and International Studies assert that, even when the technology gap is somewhat narrower, the RMA's premium on dominant battlespace awareness might drive preemptive attacks on enemy C4ISR assets. On the flip side of preemption, U.S. Army analyst Stephen Blank states a U.S. system of systems would have to deliver on the promise to provide an early knockout blow, with limited friendly casualties, to maintain domestic political support.[99]

Deterrence presents another set of issues. In Blaker's view, if potential adversaries perceive the U.S. as having the capability and the will to strike preemptively, they might be deterred by it. If not, the force's efficiency would make success highly likely. On the other hand, if an overmatched adversary believes the U.S. would be inclined to strike preemptively, it might be more impelled to strike first itself and try to induce mass casualties before the U.S. can bring its awesome capabilities to bear.[100]

Second, the more a party to a conflict believes it can achieve its exact desired effects without unintended consequences, the more likely it may be to strike. For the U.S., this notion of

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[98] Blaker, *Understanding*, 15, 17.

[99] Blank, 48-51 (cited with permission of the author); Bronson and Goure, 28; and Blaker, *Understanding*, 15.

[100] This somewhat convoluted discussion is eerily reminiscent of nuclear strategy concerns about destabilizing weapons, spirals, and imbalances. See Bronson and Goure, 28, and Blaker, *Understanding*, 17.

discrimination clearly means minimizing collateral damage. Thus, possessing high-tech and seemingly more discriminatory weaponry may actually lower the bar for decisions on using force. In other words, does the U.S. bomb precisely because it *can*, or because it *can precisely*? Put another way, is the U.S. quicker to loosen the leash on the dogs of war, since they do not seem to bite like they used to? This argument has figured prominently in the ongoing ethical debate over ALLIED FORCE, where even supporters of the humanitarian intervention have expressed concerns over the Clinton administration's instrumental preference for military responses to crises, and particularly for air power.[101]

A similar argument, though admittedly more tenuous, is the idea that by decreasing the penalty for aggression, the U.S. may actually encourage conflict, or at least fail to deter it. Maybe Robert E. Lee put it best: "It is well that war is so terrible, or we should grow too fond of it."[102] The thought that a demonstration would be insufficiently impressive drove the U.S. decision to drop the first atomic bombs on Japanese cities. This notion depends completely on whether one puts stock in the idea of the deterrent effect potential punishment of civilian populations might have on a party to a conflict. While clearly compelling for nuclear weapons, it is less so for conventional forces.[103]

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[101] For an excellent discussion of the unintended consequences of high-tech warfare, see Dunlap, 26. ALLIED FORCE-specific works are numerous, with new books and articles coming out frequently in 2000. For representative earlier works see Adam Roberts, "NATO's 'Humanitarian War' over Kosovo," *Survival* 41:3 (Autumn 1999): 102-23, and Daalder and O'Hanlon, 128-40.

[102] John Bartlett, *Familiar Quotations*, 15th ed., ed. Emily Morison Beck (Boston: Little, Brown, & Co., 1980), 509. Though various sources have it slightly differently, Lee made this comment during the December 1862 Battle of Fredericksburg, where Confederate forces holding the high ground slaughtered Union troops making frontal attacks.

[103] Robert Pape has written extensively on this subject, believing firmly that punishment is ineffective in coercion except for when it is overwhelming, as in the case of nuclear weapon attacks on cities. To nuclear ethicists, the ultimate threat of massive civilian destruction constituted the true deterrent. See Robert A. Pape, Jr., "Coercion and Military Strategy: Why Denial Works and Punishment Doesn't," *The Journal of Strategic Studies* 15:4 (December 1992): 423-75. For a moralist's view of punishment, see Paul Ramsey, *The Just War: Force and Political Responsibility* (New York: Charles Scribner and Sons, 1968), 314-28. For the U.S. decision process regarding the first use of atomic weapons, see McGeorge Bundy, *Danger and Survival: Choices About the Bomb in the First Fifty Years* (New York, Random House, Inc., 1988), 54-97 and Barton J. Bernstein, "The Atomic Bombings Reconsidered," *Foreign Affairs* 74:1 (January/February 1995): 135-6, 138-52.

Beyond this basic philosophical argument, it is unrealistic, even dangerous, for Americans to assume they can develop a technological fix for fog and friction. Paradoxically, an omniscient system of systems could increase these, because of the difference between data, information, and knowledge. While such a system is certain to deliver loads of raw data, and significant quantities of processed data (information), the result may be less overall knowledge of a situation as the ever-rising sea of noise drowns the signals. NATO saw this during ALLIED FORCE, when "increasing information requirements led to network congestion and information overload."[104] Furthermore, significant variables like combatants' psychological states and lucidity may remain unknown, and thereby left to chance. Perfect knowledge of a battlefield, as promised by zealous transformers, "flies in the face of 2,500 years of history, not to mention modern science."[105]

Another commonplace, though true, is that the U.S. is probably the nation most vulnerable to information warfare. Thus, it needs to take defensive measures, like hardening high-tech communication systems against electromagnetic pulse effects and maintaining low-tech backups, along with the know-how to use them.[106] An added benefit of this approach would be its tendency to focus thinking on what a reactive adversary might do.

Furthermore, while pieces of it may already be in place or working in microcosm,

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[104] *Kosovo/Operation Allied Force After-Action Report,* 48.

[105] See Murray, "Military Culture," 22-3 (quote). Also see M. Owens, 16-8. On the other hand, modern science is capable of providing some extraordinary insights. Harvard political scientist Stephen P. Rosen has done some fascinating research that may provide greater insight into the area of combatant psychology. His latest effort looks at the psychosomatic effects of stressors on combatants, with a specific emphasis on blood chemistry. He then explores the role these effects play in conflict termination. See Stephen Peter Rosen, "Stress, Distress, and War Termination," draft paper presented to Olin Institute for Strategic Studies, Harvard University, Cambridge, MA, February 2000 (presented 6 March 2000).

[106] Michael O'Hanlon, "Military Technology Changes are Slower Than We think," *Aviation Week & Space Technology,* 28 February 2000, 70; Statement of Schlesinger, *Hearings Before the Committee on Armed Services,* 67.

building a robust system of systems could be a daunting technical (and fiscal) challenge.[107]

Related to the foreign policy discussion above, the U.S. would need to rationalize the multiplicity of architectures within both its own organizations and those of potential partners. The U.S. would also have to be very careful not to create friendly vulnerabilities or centers of gravity in the pursuit of efficiency. Worse, over-investment in single solutions could lock the U.S. into a warfighting doctrine one author compared to the pre-World War II French, with their fixation on the "methodical battle."[108] Radical transformation increases U.S. aggregate risk by putting many investment "eggs" in a basket based on shaky assumptions about future combat.

Moreover, even if technically feasible, the system of systems has limited applicability. Its greatest promise lies in fighting and winning wars, i.e., the "respond" piece of the U.S. strategic rubric. Thus, it has its maximum utility in a permissive physical and political environment, when constraints are fewest.[109]

Ironically, such an environment could prove ephemeral due to the system of systems' own efficiency. By allowing elites at the strategic level, e.g., the President and SecDef, real-time access to the tactical and operational levels of warfare, it invites micromanagement and adds bureaucratic layers to the decision process, stifling responsiveness.

The post-World War II history of conflict tells us U.S. elites behave this way more often than not. The most notorious case was probably in Vietnam where, as historian Martin van Creveld has documented, information availability fed a trend toward centralized command and

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[107] For a description of some of the difficulties, see the Prepared Statement of Senator Dan Coats (IN), *Hearings Before the Committee on Armed Services*, United States Senate, 105th Congress, 2d Session, 28-29 January 1998 (Washington, DC: GPO), 61-3.
[108] A fixation that fell apart tragically in the 1940 Battle of France. This is commonly and incorrectly called a "Maginot mentality" after the famed system of defenses of that name. See John A. Antal, "The End of Maneuver," in *Digital War: A View from the Front Lines*, ed. Robert L. Bateman III (Novato, Calif.: Presidio Press, 1999), 153-70.
[109] The Defense Science Board recognized this in recommending that SecDef and CJCS should create a transformation vision not limited to the high end of conflict. See *Report of the Defense Science Board*, 29.

control. The Vietnam air war is the most well-known example, but it also included instances like pushing the decision to deploy three more battalions in October 1967 all the way to President Johnson, despite there being half a million U.S. forces already in the region. Centralization in turn has fueled an appetite for more information, driving a requirement for more capable systems, in turn increasing information availability in an ever-upward information spiral. The net effect has been a significantly slowed decision cycle.[110]

Since Vietnam, legislative remedies like Goldwater-Nichols have perhaps mitigated this effect somewhat, but the Gulf War and ALLIED FORCE indicate that heavy strategic-level involvement, as well as an insatiable thirst for information, still prevail and slow down responsiveness. Many writers and analysts have discussed the Gulf War phenomenon. For ALLIED FORCE, NATO's widespread use of video teleconferences to discuss strategic and operational issues facilitated staff coordination, but also guaranteed "strategic and operational commanders were able to directly influence tactical operations."[111]

The system of systems could also flood lower decision-making levels with much of the same information available to the top. This could increase the potential number of decision makers involved horizontally as well as vertically, again slowing responsiveness. Looking downward, some have argued that offering subordinates an opportunity to see the "big picture"

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[110] Van Creveld's "information pathologies" include centralization and increased complexity. His account of the avalanche of info generated in Vietnam included one organization that produced over half a ton of reports daily, and another two facilities that together processed up to a million messages a month. See Martin Van Creveld, *Command in War* (Cambridge, MA: Harvard Univ. Press, 1985), 236-8, 244-7, 255-6, 258-60.

[111] Interestingly, centralization is the opposite of what Admiral Owens saw as the resulting organizational structure for the system of systems. See W. Owens, "American Revolution in Military Affairs," 38. For representative Gulf War writings, see H. Norman Schwarzkopf with Peter Petre, *It Doesn't Take a Hero* (New York: Linda Grey-Bantam Books, 1992), 322, 418, 441-5, 460 (here General Schwarzkopf depicts Pres. Bush as much less of a micromanager than Vietnam-era leaders), 468-72 and Powell, *American Journey*, 507-28. For example, after the Al Firdos bunker bombing inadvertently killed Iraqi civilians, General Powell says, "Schwarzkopf and I started reviewing targets more closely before each day's missions" (Powell, *American Journey*, 513). For Kosovo, see *Kosovo/Operation Allied Force After-Action Report*, 28 (quote), 47, and Kitfield, 2158-9. DoD's report claims the video teleconferencing actually speeded responsiveness, but needs to test this hypothesis further and also assess it in terms of the potential negative effects of centralized execution of tactical operations.

in the course of operations might cause them to second guess the decisions of their leaders and take actions the leadership neither intends nor desires. On the other hand, overly centralized control and execution may not be optimized for the American culture because it stifles initiative.[112]

Another information-intensive area is logistics. Here, friction has generated legendary screw-ups, some comic, some tragic. For example, while the Gulf War was on the whole a logistic marvel, it featured numerous examples of "priority creep," as when cargo handlers discovered pallets containing administrative supplies, truck tires, and sandbags coded as a combat-essential shipment for airlift. The coalition's commander, General H. Norman Schwarzkopf, relates an apoplexy-inducing incident when he "learned that the first unit landing in Saudi Arabia was the airborne corps *headquarters staff*," instead of combat soldiers. Looking back to World War II, during the frozen hell of Stalingrad, the *Luftwaffe* took horrendous losses in trying to airlift supplies to the encircled German Sixth Army. While historians have generally been sympathetic to their otherwise heroic efforts, the years have seen persistent "claims that hundreds of thousands of condoms, tons of mosquito repellent, and so on were carried into Stalingrad."[113]

As we saw in the introduction, transformers have advocated centralization and rationalization of what they see as duplicative support structures within DoD, logistics among

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[112] While I tend to think these arguments are a bit overstated, it is true we are putting a lot of responsibility in the hands of often relatively inexperienced military members. Plus, the RMA may provide them with access to weapons of ever-greater potency. For a positivist view, see Corbett, 27-31. For another side, see Dunlap, 27-9, 32-3. Also see Blank, 46-7 (cited with permission of the author).

[113] For Gulf War examples, see James K. Matthews and Cora J. Holt, *So Many, So Much, So Far, So Fast: United States Transportation Command and Strategic Deployment for Operation Desert Shield/Desert Storm* (Washington, DC: GPO, 1996), 59-60; Keaney and Cohen, 209; and Schwarzkopf, 311 (first quote, emphasis in original). For Stalingrad example, see Joel S. A. Hayward, *Stopped at Stalingrad: The Luftwaffe and Hitler's Defeat in the East, 1942-1943* (Lawrence, KS: Univ. of Kansas Press), 296 (second quote). Hayward relates the story of a shipment of fish meal being air dropped, for which the supply officer may have paid with his life once the *Luftwaffe* leadership discovered it. Hayward does make a point of characterizing these incidents as exceptions to the rule, however.

them. While it is useful for DoD to seek efficiencies in its business side, Vietnam showed centralizing combat logistics to be dysfunctional.[114] The desire for optimization, if accompanied by consolidation of the wholesale logistics infrastructure, would inevitably drive *JV 2010's* focused logistics concept toward centralization. Here, transformers would do well to remember a simple theory of combat logistics: If any unit goes ineffective due to lack of food, water or medicine, or if one weapon goes "click" when fired, instead of "bang," the logistics system (and leadership) has failed.

The Reactive Adversary[115]

These arguments highlight the RMA's rather one-sided vision of warfare. This vision shortchanges the Clausewitzian adversary, who can trump U.S. technological superiority with a better strategy and a stronger will. Being able to see everything through dominant battlespace awareness does not mean you can kill everything. In short, perfect knowledge does not guarantee a perfect outcome.

First, once wars begin, they will not stay clean. As U.S. Air Force officer Charles J. Dunlap, Jr., states, "We cannot expect future adversaries to be 'grateful' that the United States used 'humane' PGMs against them." Similarly misguided logic asserts U.S. use of non-lethal weapons or information attacks will somehow elicit a less bloody, i.e., reasonably symmetric or proportional, response. Instead, when facing a high-tech U.S. threat, others may in fact raise the

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[114] Gaining a sympathetic ear in the Senate, Owens has maintained there are five organizations—one for each service and one for DoD—working these areas. See Owens, Lieberman, and Robb, *Hearings Before the Committee on Armed Services*, 42-4, 48-50. Also see W. Owens, "Revolutionizing," 27-8 and Conetta and Knight, 35. For Vietnam's horrors, see Van Creveld, 245-6.

[115] Clausewitz said "In war, the will is directed at an animate object that *reacts*." See Clausewitz, 149 [emphasis in original]. When I briefed this section to several audiences in the Boston area, I conducted a free play exercise where I put the audience in the shoes of an adversary contemplating an attack on U.S. interests, and facing a likely U.S. military response. I asked them what actions they might contemplate to deter/defeat the U.S. Perhaps not

stakes by resorting to first use of weapons of mass destruction. Terror weapons can be a cheap and quick counter to U.S. conventional superiority. They are relatively easy to acquire or make, and the U.S. will remain vulnerable to them, despite defensive and protective measures.[116]

Other harsh counters to U.S. technological superiority could include inducing an environmental disaster—like Iraq's burning of oil fields during the Gulf War—using human shields, seizing hostages, or conducting terrorist attacks on U.S. assets around the world. Who can forget seeing UNPROFOR peacekeepers chained to potential targets in Bosnia? Others who have allegedly used human shields include the Iraqis, Somalis, and Serbs (the latter during ALLIED FORCE). Bad guys know liberal democracies would not likely strike targets thus protected, even when international law allows it. A similar situation prevails when concerns over collateral damage induce U.S. self-deterrence, thereby creating enemy sanctuaries.[117]

A reactive adversary will find ways to deceive, fool, and delay high-tech forces. For example, while the U.S. will almost certainly develop advanced sensors over the next twenty-five years, finding weapons buried inside buildings or underground will remain a challenge. It may not be possible to find a determined adversary's most critical assets, like weapons of mass destruction and their components, without having people on the ground to provide human intelligence. Plus, reactive adversaries will disperse or conceal assets, and practice deception to elude detection, or encourage detection of the wrong things, as the Iraqis did during the Gulf War

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surprisingly, most of the actions suggested targeted the will of the American populace to support or sustain military operations against the notional aggressor.

[116] Dunlap, 5-9, 24-6, 30-2 [quote on p. 5]. For the threat of WMD proliferation, see Carter, Perry, and Steinbrunner, 6, 26, 30-8, 48-51, and The United States Commission on National Security/21st Century, 3, 4.

[117] There is an increasingly blurred distinction between "civilian" and "military" target sets, e.g., information networks, space infrastructures, and electrical grids. While PGMs and non-lethal or non-destructive technologies may reduce physical damage, the potential for harmful second-order effects on non-combatants grows as their reliance on the specific systems grows. PGMs allow *more precise destruction* of targets. While *more precise* means reduced collateral damage (first-order effect), *precise destruction* may mean more trauma for non-combatants over the long term (second-order effect) as essential goods and services take longer to restore or replace. For this and more, see Dunlap, 5-12, 19-26, 30-2; Corbett, 33; Blaker, *Understanding*, 17; and Ellis, slide 10. For alleged

and the Serbs did during ALLIED FORCE. A related tactic (also practiced by the Serbs) renders standoff weaponry impotent against ethnic cleansing, i.e., when the adversary intentionally intermingles its forces with the civilian population. Finally, adversaries may use information operations, e.g., "the CNN factor," to their advantage. During ALLIED FORCE, a senior NATO commander claimed Serbia was essentially able to kill or terrorize thousands of non-combatants in near anonymity, while alleged NATO "war crimes" made the evening news worldwide.[118]

Potential adversaries, while unlikely to effect the same kind of transformation the U.S. is capable of, should be able to exploit commercially available technologies. In this way, niche competitors could gain significant capabilities for around $2 billion annually (over the course of a few years). They may focus on denying U.S. strengths. For example, according to one study, "a lesser power can aspire to attack the information sensors in our reconnaissance strike complex much more readily than to create full-fledged counterparts."[119]

Negating U.S. hyperwar is a global growth industry. Recent reports indicate China may be developing radar systems to track stealth aircraft. Space-based navigation, imagery, weather data, and communications are available to anybody with the wherewithal to obtain them, as are Global Positioning System (GPS) jammers. Over thirty countries manufacture unmanned aerial

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Serbian use of human shields in Kosovo, see Human Rights Watch Report (cited above) and *Kosovo/Operation Allied Force After-Action Report*, 6.

[118] For Clausewitzian views, see M. Owens, 65, and Tilford, *Revolution*, 17. On reactive adversaries in general, see Blank, 3 (cited with permission of the author); Keaney and Cohen, 123-4, 127; Dunlap, 6-9; Dubik, 4; Statement by Senator Coats, *Hearings Before the Committee on Armed Services*, 62-3; and The United States Commission on National Security/21st Century, 6. For examples of Serbian resourcefulness and ability to mask atrocities, see *Kosovo/Operation Allied Force After-Action Report*, 6, 61-3. For the CNN factor during ALLIED FORCE, see Ellis, slides 13, 19. Dr. Michael O'Hanlon of the Brookings Institution has been a skeptic of the RMA. He has a recent book out on the subject entitled *Technological Change and the Future of Warfare*. He discusses tactics a reactive adversary might use in Michael E. O'Hanlon, "Implications for Future U.S. Forces of Operation Allied Force: Is the Force Mix Right? Can We Accomplish the Mission?" c. November 1999, <http://www.ndu.edu/inss/symposia/topical99/ohalon.html> (cited 12 April 2000), paras. 10-11 under "Airpower in Future Wars," and O'Hanlon, "Military Technology," 70. As a final point, DoD is researching ways to "see" underground and remove this as a sanctuary (an ALLIED FORCE lesson learned; see pp. 56, 63 in DoD report cited above); see Bryan Bender, "Radar Breakthrough Could Help DoD 'See' Underground," *Jane's Defence Weekly*, 22 December 1999, 8.

vehicles. Of course, the internet and wireless phones are ubiquitous. And, remember what a handful of *mujahadeen*, armed with Stinger missiles, did to deny Soviet war aims in Afghanistan. If or when the U.S. is thwarted, it will surely try to regain its edge, stimulating the sort of technological seesaw familiar to military historians.[120] Ironically, countries lacking open markets and democratic defense procurement processes may be able to field modern weapons more quickly than the U.S., if they have the economic resources.

Finally, technological superiority at the tactical and operational levels does not compensate for poor policy or strategy. For the U.S., this is a lesson of Vietnam and post-Cold War contingencies like Somalia. Similar outcomes afflicted the Dutch in Indonesia, the French in Indochina and Algeria, the Soviet Union in Afghanistan, and the Russians in Chechnya (certainly the first time and maybe now again).[121] Arguably, two of the most dazzling displays of technological and tactical virtuosity in modern warfare occurred over the Bekaa Valley in 1982 and in and over the deserts of Kuwait and Iraq in 1991. Yet, nearly eighteen years after Bekaa, Israel was still fighting in southern Lebanon, and nine years after the Gulf War the U.S. and its partners were still striking Iraq, keeping significant forces deployed for this purpose.[122]

Specific Nature of Challenges

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[119] For the $2 billion annual estimate, see Bronson and Goure, 29. Quote is from Carter, Perry, and Steinbrunner, 51. The "reconnaissance strike complex" was an early term for what today we might call the system of systems.
[120] For a simplistic example of the technological see-saw, consider how longbows overcame lancers, muskets overcame longbows, rifles overcame muskets, machine guns overcame rifles, etc. The World War II Battle of the Atlantic provides a classic view of this inevitability; for a good synopsis, see John Keegan, *The Second World War* (New York: Penguin Books, 1991), 103-23. Also see Tilford, *Revolution*, 15-6; Institute for National Strategic Studies, "Revolution in Military Affairs," 1, 3; Shelton, "Operationalizing," 103; Ben Macintyre, "China Can 'See' U.S. Stealth Aircraft," *The Times (London)*, 30 November 1999, 22; Dunlap, 33-4; and Corbett, 35. For the current see-saw regarding GPS, see H. Gershenoff, "Russian GPS Jammer Introduced" and Mario M. Casabona, "Countering GPS Jamming," both in *Journal of Electronic Defense* 22:8 (August 1999): 28. Also see Mark Hewish, "Smart and Smarter," *Jane's International Defense Review* 33:1 (January 2000): 51.
[121] Blank, 3, 47-8 (cited with permission of the author); van Riper and Scales, 15, 19.
[122] While, as of March 2000, the Israelis were considering withdrawal of their forces from Lebanon, the U.S. had an ambiguous containment policy and no end in sight to their commitment.

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While the first element of the warfighting context deals with the more theoretical side of war, the second concerns what the U.S. expects it will ask its forces to do. Here, the "shape—respond—prepare" trio provides a generic template absent a clear strategic forecast. A central facilitator for these objectives is physical presence, which the *QDR Report* cited as "vital to both the shaping and responding elements." *JV 2010* also saw a long-term requirement for physical presence and the U.S. *National Military Strategy* lists overseas presence as one of its four strategic concepts.[123] How, then, do forces achieve physical presence?

By promising to put the right force for the right effect at the right place and time, the RMA pledges force structure and budget reductions. One of the reasons the U.S. deploys forces forward in peacetime is to increase responsiveness to emerging crises. Such flexibility is especially important due to the inherent limitations of strategic warning, as well as the previously noted U.S. susceptibility to surprise. In this case, if dominant battlefield awareness could increase indications and warning of impending trouble, it would allow the U.S. to reduce its forward-deployed or stationed forces by some proportion. Coupled with focused logistics and precision engagement, the net effect would be increased U.S. capacity to respond to dangerous situations with a more home-based, and presumably smaller, force structure than today. Such "just-in-time" warfare reduces the need for forward basing or pre-positioning of assets, shrinking the U.S. footprint overseas.[124]

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[123] Shalikashvili, *JV 2010*, 14, 18, 27; W. Cohen, *Report of the QDR*, 9-13, 16-7 (quote on p. 16). Also see Shalikashvili, *National Military Strategy*. In a hierarchical way, effective shaping can preclude responding through confidence-building measures, engagement, and deterrence.

[124] For example, along with logistic assets, much of an advanced C4ISR infrastructure could function from the continental U.S. See Bronson and Goure, 25, 27. For effects of enhanced situational awareness, see Blaker, *Understanding*, 25. For possible DoD rationalization and budget reductions, see W. Owens, *Hearings Before the Committee on Armed Services*, 40-50 and Blaker, "American RMA Force," 21-30. As the reader will recall, Blaker estimated his proposed force would allow a reduction from the 1997 budget level of around $250 billion to $210 billion (in constant fiscal year 1997 dollars) by 2007. Owens also estimated a $40 billion annual savings in his testimony, to which Dr. James Shlesinger commented later in the same hearings, "[Owens' cuts will yield] an aggressive program of jointness perhaps not an effective program of jointness" (see p. 79).

However, fewer forces and a smaller overseas footprint place severe challenges on physical presence. One possible solution would be to increase use of reserve component forces for generic presence missions as well as specific operational rotations. A current example of the latter is the March 2000 deployment of 800 members of the Texas National Guard's 49th Armored Division to Bosnia to take command of NATO's American sector. In the future, widespread use of such an approach could maintain robust physical presence while freeing active, presumably transformed, forces for responding.[125]

However, there are a number of problems with relying on the reserve component too heavily for these missions. For one, what happens if or when DoD transforms its reserve components? We may be back to square one. Further, there is a certain "spin-up" cost involved in preparing many reserve component forces for demanding missions. Also, reservists and National Guard members are more sensitive to operations tempo than active forces due to their civilian employment concerns. As Major General James Sherrard, Chief of the Air Force Reserve, noted in recent Congressional testimony: "An average of nearly 3,000 Reservists deployed overseas each month [in 1999] and worked more than 712,000 Military Personnel Appropriation (MPA) mandays, the highest number since Desert Storm."[126] Extended overuse of the reserve component can erode domestic popular support for U.S. policy. Major General Dubik suggests possible legislative remedies allowing more flexible call-up of reservists, along

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[125] "Reserve component" is a generic term for service reserve and National Guard forces. For initiatives to use the reserve component for key rotational missions, see Blaker, "American RMA Force," 25, and Blaker, *Understanding*, 23-4, 30. For specifics of current Bosnia mission, see Paul Stone, "Bosnia Mission Helps Solidify Total Force Integration," *Armed Forces Information Service News Articles*, c. 4 February 2000, <http://www.defenselink.mil/news/Feb2000/n02042000_20002041.html> (cited 12 April 2000).

[126] Statement of Major General James E. Sherrard III, Chief of Air Force Reserve, quote from: U.S. Congress, Hearing of the Military Personnel Subcommittee of the House Armed Services Committee (Date: 3/8/00), text from: *Federal Document Clearing House Congressional Testimony*, available on: *Congressional Universe* (Online Service), Bethesda, MD: Congressional Information Service.

with protecting their civilian jobs.[127]

Furthermore, where platforms matter more than people do in establishing presence, RMA technologies can reduce the manning requirements for specific systems. For instance, the U.S. Navy intends to man its new DD-21 land-attack destroyer with ninety-five sailors, about one-third the complement of current equivalents.[128]

On the other hand, some of the RMA-related substitutes for physical presence have been lead balloons, at least inside DoD. One was the U.S. Air Force's notion of achieving presence through "virtual" means. Another controversial idea, mentioned briefly above, was the substitution of mobile offshore bases (large man-made islands) for carrier battle groups, thereby allowing perhaps a 30 percent reduction in the Navy's main *raison d'être*.[129]

Operations tempo drives the requirement for physical presence. If tempo remains high, as most assessments posit, this could tangibly increase the stress on already busy service members. Coupled with a leaner, transformed force, it could easily generate "too much mission" to go around. *JV2010's* mandate to make forces readier to respond could exacerbate the problem, leading fewer people to do more with ever-less preparation time. The NDP supports a future where "Smaller force structures will be the norm, an evolution that must parallel the development of new operational concepts. *Regular deployments to far-flung areas of the globe, from open deserts to confining urban terrain, therefore, are something we should expect.*"[130]

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[127] Dubik, 7-8.

[128] For the DD-21 initiative, see J. A. Carnevale Jr., "DD-21: Offensive, Responsive, and Flexible," *Sea Power* 42:9 (September 1999): 34-6; Jerry MacArthur Hultin, "The Business Behind War Fighting," *United States Naval Institute Proceedings* 125:9 (September 1999): 56-9; and W. Cohen, "No Shortchanging," A27.

[129] For virtual means of establishing presence, see Department of the Air Force, *Global Presence* (Washington, DC: Department of the Air Force, 1995), 1, 7, 15. For mobile offshore bases, see Blaker, "American RMA Force," 23-6 and W. Owens, *Hearings Before the Committee on Armed Services*, 42.

[130] NDP, *Transforming*, ii [emphasis added]. For additional NDP perspective, see NDP, "Assessment," para. 12 under "Principal Observations & Recommendations." DoD and some Congressmen have been demonstrative about protecting service members. See W. Cohen, *Report of the QDR*, 37, and Senator Charles Robb (VA) and Senator James Inhofe (OK), *Hearings Before the Committee on Armed Services*, United States Senate, 105th Congress, 2d Session, 28-29 January 1998 (Washington, DC: GPO), 29-32, 81-2. In these same hearings, former SecDef James

Here we have a double whammy: the second sentence potentially raises the flexibility bar for the forces in the first sentence beyond the reach of even the most innovative operational concept. This is particularly acute when readiness is already a problem, as it is today. Sometimes, "smaller" means *smaller*, not *more agile*.[131]

Conversely, for hedgers, physical presence offers additional supporting arguments. Real, not virtual, U.S. forces say *resolve* like nothing else. Phrases like "rubber on the ramp," "muddy boots on the ground," or "carrier battle group steaming to the [fill in the blank]" invoke powerful images, and sometimes nothing beats "eyes on" a situation for gaining intelligence. As a recent National Defense University study asserted, if the nexus of threats to U.S. interests continues to stay south of the Cold War trajectory in areas where the U.S. has limited infrastructure, then forward deployed forces will remain essential to U.S. response capability.[132]

In the end, while a system of systems would almost surely enhance situational awareness for future Bosnias and Somalias, its price tag could easily leave the U.S. with too few forces, or the wrong kind of forces, for these or other tasks requiring physical presence. While some in DoD might welcome this respite—and we should never forget (reprise) "Our Armed Forces' foremost task is to fight and win our Nation's wars"—it is ostrich like. The price of world leadership is world engagement, and the U.S. may have seen the future in the battles of the Balkans.[133] The only argument should concern levels of U.S. support for specific contingencies. The U.S. may also need to ensure all its instruments of national power are as sharp as its swords,

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Schlesinger was even more categorical, noting (see pp. 64-5) that DoD simply could not cut force structure until it cuts operations tempo. Also see Dubik, 6.

[131] A mistake Blaker, among others, makes. See Blaker, "American RMA Force," 28.

[132] For the strategic view, see Binnendijk and Kugler, xvii. Their "southern arc" thesis puts a higher premium on maritime forces, but one could argue for the utility of deployable, expeditionary forces of all types for austere operating environments. For other arguments, see Tilford, *Revolution*, 14, 17; O'Hanlon, "Implications," paras. 3; 7 under "Airpower in Future Wars"; and Bronson and Goure, 25.

[133] Quote from Shalikashvili, *National Military Strategy*, para. 4 under "Introduction." Also see Cleland, *Hearings Before the Committee on Armed Services*, 34.

so as to reduce its reliance on the latter.

In conclusion, *the future warfighting context tips the argument to the hedgers*. The dialectic on U.S. foreign policy revealed a definable, though difficult, path to transformation for the U.S. and its key military partners. However, when it comes to the nature of warfare, even if the system of systems could burn through the fog and friction of war—a big if—it would not necessarily make war more efficient or compensate for inadequate policy. The U.S. would still be dealing with reactive adversaries. In the realm of forecasting, the NDP's charge to accept present risk to obviate future risk is a non-starter. For one, the world will not let the U.S. off the hook so easily. And if the U.S. disengages anyway to transform its military, it may find its influence diminished by the time it is done.

...BUT DRIVE WITH YOUR LOW BEAMS ON: RECOMMENDATIONS

The U.S. needs to exploit its technological advantages and maintain its lead, but the warfighting context argues for a hedged approach. So what should the U.S. do? Are there tangible strands DoD can weave into the whole cloth of a "hedged transformation" strategy? Using another metaphor, can it hone its "swords into stilettos" and still do what it needs to do strategically?

Foster Robust Experimentation

I believe the answer is yes. First, *joint experimentation needs to increase and include key military partners wherever possible.* Both Congress and DoD support joint experimentation fully, and a bureaucratic superstructure exists in the form of the USJFCOM, with its four-star commander-in-chief. For example, this year USJFCOM plans to conduct twenty-four joint experiments.[134] Among the things the U.S. needs to decide is how best to integrate its own forces, as well as those of its key military partners, into the experimentation scheme. Here, any future transformation may require significant changes in force structure or force presentation.

In pursuing joint experimentation aggressively, DoD needs to avoid some not-so-obvious pitfalls. Here is a partial list of recommendations:

- First, experimentation needs to push ideas and equipment to failure, and the system needs to tolerate failure when it occurs. It is better to lose a wargame than a war. As a result, a "smaller is better" approach may be best. The Defense Science Board cautioned against "Super Bowl"-type events because it feared participants would foster a zero-defects mentality through self-inflicted pressure to succeed, stifling

learning.

- Second, the experimentation community needs to avoid developing its own parochialisms or preconceptions about lessons learned. Not all good ideas will be invented by the experimentation community. In fact, once the idea of such a "community" exists, this phenomenon will begin to pose potential problems.

- Third, the process needs to harness the intellectual energy and expertise of younger operators, who can plant the seeds of their own success.

- Fourth, DoD needs to ensure Joint Forces Command gets the resources it needs to keep experimentation viable. The Defense Science Board found around $550 million annually allocated for DoD-wide experimentation for fiscal years 2000-2005, a relatively small amount by DoD standards. In fairness, there are many related activities conducted under the umbrella of science and technology ($7.5 billion requested by DoD for fiscal year 2001); this money in turn is nested in an even larger research, development, test, and engineering appropriation ($37.8 billion requested). Still, experimentation needs visibility in its own right.

- Finally, war games and experiments need to be imaginative and wide ranging. They should especially consider a reactive adversary who attacks asymmetrically. To facilitate this, DoD needs to develop new assessment tools, e.g., models, for future warfare.[135]

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[134] Office of Management and Budget, *Budget: Fiscal Year 2001*, 174.
[135] For the views of the Defense Science Board, see *Report of the Defense Science Board*, 7, 16, 18, 22, 25-6. The current CJCS cited a series of experiments in an *Airpower Journal* article. Interestingly, among them was Global Challenge, a massive "Super Bowl" event in 2004 to test *JV 2010* and feed the 2005 QDR. See Shelton, "Operationalizing," 104-6. For the idea of avoiding new parochialisms, see Conley, 66. For ensuring younger members participate, see Fitzsimonds and van Tol, 24-31. For current budget projections, see Office of Management and Budget, *Budget: Fiscal Year 2001*, 154. On imaginative experiments and new assessment tools, see Tilford, *Revolution*, 15; Murray, "Military Culture," 25; Rosen, *Winning*, 260; and NDP, "Assessment," para. 8

DoD needs to continue encouraging its friends and allies around the world to join in U.S. experiments. USJFCOM has established a program of combined experimentation and expects to have twenty partners by the end of fiscal year 2000. The individual services similarly share experiments with selected friends and allies. This notion would also be consistent with a DCI pledge to open experiments by any NATO nation to all NATO nations.[136]

Speaking of NATO, if you buy the argument that the U.K., France, and Germany are potential key military partners for the U.S., then it might make sense to conduct more experiments in Europe. These could fold into existing U.S. European Command experimentation and exercise programs. For example, the command either now sponsors, or in the near future will sponsor, nine Advanced Concept Technology Demonstrations (ACTDs), a leading DoD experimentation venue. They also have a significant quota of CJCS-sponsored exercises, with fifty-five scheduled for this fiscal year. CJCS calls these exercises "my principal vehicle for achieving joint and multinational training" and are a valuable way to develop interoperability. As a case in point, a communications and information systems interoperability exercise European Command began in 1995 has grown to include thirty-four nations, in addition to NATO participants.[137]

However, increasing European-based experimentation faces several impediments. For

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under "Other Matters to be Considered." Finally, the need to anticipate reactive adversaries in the future was one of the ALLIED FORCE lessons learned. See *Kosovo/Operation Allied Force After-Action Report,* 7.

[136] William S. Cohen, *Annual Report to the President and the Congress: 2000* (Washington, DC, GPO, 2000), 132-3 (if not yet available through GPO, can be accessed via *n.d.,* <http://www.dtic.mil/execsec/adr2000/> (cited 8 April 2000), chap. 11, "A Strategy for Military Transformation"). Also see *Kosovo/Operation Allied Force After-Action Report,* 127.

[137] All ACTDs are sponsored by combatant commanders-in-chief (CINCs). ACTDs normally consist of prototyping and field testing, and provide a fast track to acquisition (two-four years) for successes. DoD has thirty-nine total ACTDs underway, with eight planned for completion this fiscal year. See W. Cohen, *Annual Report,* 129-30. For European Command specifics, see General Wesley K. Clark, "Statement Before the Senate Armed Services Committee, February 29, 2000," updated 29 March 2000, <http://www.eucom.mil/posture/2000/> (cited 3 April 2000), 15, 29 (".pdf" version cited). For CJCS position, see "Posture Statement of General Henry H. Shelton, USA, Chairman of the Joint Chiefs of Staff, Before the 106th Congress, Committee on Armed Services, United States

one, Congress cut funding for fiscal year 2000 CJCS exercises due to concerns over operations tempo. Such cuts have left the European Command with seventeen fewer CJCS exercises scheduled for this year than last. CJCS has instituted his own 32 percent reduction in exercise sponsorship since fiscal year 1996, and the incumbent has argued against any more reductions.[138] An additional concern would be ensuring adequate ranges, airspace, and training facilities existed in the face of environmental and other social concerns.[139]

There may also be a way to experiment with a system of systems to see, first, if it is technically feasible, and second, to see how it would work in the face of friction. Here, I would propose a field test of (at least) the C4ISR portions of a system of systems, using the current counter-narcotics mission in the Caribbean Basin and Andean Ridge regions. Funding for all or part of the test could be pursued under the ACTD rubric, perhaps as a joint venture between USJFCOM and U.S. Southern Command.[140]

Among the attributes making this an appealing test are the geographic size and diversity of the area. In addition to a large maritime element, the area also contains the greatest challenges to modern ISR technology: jungles, mountains, and urban terrain.[141]

Senate, 8 February 2000," updated 29 February 2000 <http://www.dtic.mil/jcs/> (cited 3 Apr 2000), para. 68 (quote).

[138] For status of European Command exercises, see Clark, "Statement Before the Senate Armed Services Committee," 15, 29. For CJCS exercise program reductions, see "Posture Statement of General Henry H. Shelton," paras. 68-70.

[139] High-visibility incidents do not help, like when a U.S. Marine fighter severed an Italian ski gondola's cable, causing the gondola to crash to the ground and killing all the occupants. See Steven Lee Myers, "Cohen Tries to Calm Italy Over Deaths at Ski Lift," *New York Times*, 8 February 1998, late edition, A9. The recent controversy over the Vieques range in Puerto Rico also highlights the difficulties in finding and keeping suitable combat training facilities. A comparable initiative to the one I describe here was launched for Alaska. For a good synopsis of the effort and its problems, see David A. Fulghum, "Vast Training Space Lures Diverse Forces to Alaska," *Aviation Week & Space Technology*, 21 September 1998, 54.

[140] Southern Command is the only combatant command not listed in the 2000 SecDef *Annual Report to the President and the Congress* as working with USJFCOM on concept development and experimentation, so this initiative would also be good for both commands. See W. Cohen, *Annual Report,* 129-30.

[141] During my year as a Harvard fellow, I was fortunate to be part of a group that was invited by Colombian President Andres Pastrana (a graduate of the program I was in) to learn about the Colombian perspective on the drug issue firsthand from the President and his Cabinet. That experience, along with multiple sessions with academics and Colombian officials at Harvard, gave me a superb opportunity, for which I am very grateful. For a good

A field test would address many of the challenges described in earlier chapters. It would enhance ongoing efforts involving the U.S. and its partners in the drug war, including the British, Dutch, French, Caribbean nations, and Latin Americans. Internally for the U.S., the test would exercise interagency planning and coordination. Externally, it would reveal the implications of a system of systems on U.S. ability to sustain a coalition (especially a multilingual one). Most importantly, it would test the system of systems against its greatest challenge of all, an extremely adaptive and reactive adversary. In any case, the extra attention could only help with a tough mission and, if the test fails, the U.S. learns without the harsh penalties of failing in combat.[142]

Finally, the U.S. needs a force structure that balances optimal experimentation with reasonable operations tempo. We saw in the introduction how the Vanguard and strategy-based proposals each set aside a portion of the force structure for experimentation. This approach has several drawbacks. By creating a special experimentation cadre, it uproots these forces from the fertile ground of current operational experience. The obverse of this effect is the inculcation of the aforementioned experimentation "community" mindset. Further, giving resource priority to these forces (a feature of the Vanguard force) risks elitism, with a concomitant ill effect on the rest of the force structure's morale. Worst of all, these approaches potentially reduce the pool of resources to cope with likely heavy real-world demands. The resultant inequities in operations tempo would have potentially disastrous effects on the U.S. military's readiness, morale, and retention, with an ultimate risk to U.S. world influence.[143]

synopsis of Colombia's situation, see Gabriel Marcella and Donald Schulz, *Colombia's Three Wars: U.S. Strategy at the Crossroads* (Carlisle Barracks, PA: U.S. Army War College Strategic Studies Institute, 1999).

[142] For an excellent review of various efforts in the drug war, including use of C4ISR assets and coalition operations, see Matt Blizard and Joe DiRenzo III, "What We Need to Win the Drug War," *United States Naval Institute Proceedings* 124:11 (November 1998): 60-2.

[143] These effects would be particularly hard on General Dubik's strategy-based force if the U.S. continues to face challenges on the lower end of the conflict spectrum (missions like peacekeeping, humanitarian relief, etc.), since his proposal potentially leaves a smaller residual force to cope with these missions than the Vanguard proposal. In trying to find a way around this problem, Blaker undermines his own proposal by suggesting the U.S. "stagger the

One way to level the playing field would be to distribute *all* tasks among *all* front-line forces. Today, three of the four services have organized their forces into distinct rotational elements. The Navy and Marine Corps operate from a force posture of twelve Carrier Battle Groups (CVBGs) and twelve Amphibious Ready Groups (ARGs)/Marine Expeditionary Units (MEUs), and the Air Force has recently implemented the Expeditionary Aerospace Force concept, with ten rotating aerospace expeditionary forces (AEFs) and two additional on-call AEFs for crisis response. These AEFs are composite forces that represent the range of Air Force core competencies. While the Army has not yet organized in such a fashion, their ten active divisions, two armored cavalry regiments, and fifteen National Guard enhanced separate brigades could conceivably be reconciled with the other services' expeditionary constructs.[144]

I propose dividing these forces into ten standing JTFs. Each JTF would consist of a CVBG, ARG/MEU, AEF, and an Army force element (to be determined). Two JTFs at a time would be linked together in a five-phase program. The first phase would be an operational deployment or on-call vulnerability. After this, the JTFs would temporarily break up for a spin-down and refitting period, focusing on internal service requirements. The JTF would re-form for the third phase, experimentation, an advantage being that the entire force structure would benefit from experimentation, and experimentation would benefit from the experience of the entire force structure. The fourth and fifth phases would consist of service and joint preparation (spin up) for operations, respectively. After this, the JTF would be back into the operational phase, restarting the cycle. Residual front-line forces would serve as a strategic reserve or to provide overseas

experiments" to ensure "the entire force would not be 'off line' at any one time, at least for several years, and then only if the international situation permitted." This begs the question as to whether the idea would ever get off the ground given the recent U.S. track record. On the subject of morale, the "Vanguard" label itself would have potentially negative implications. Blaker disputes this. See Blaker, *Vanguard*, 5 (quotes), 7.
[144] For information on all forces, see W. Cohen, *Annual Report*, 41-9. For AEF specifics, see F. Whitten Peters and Michael E. Ryan, *U.S. Air Force Posture Statement 2000* (Washington, DC: Department of the Air Force, 2000),

presence in areas not covered by the standing JTFs.

This is far from a complete proposal, but I present it here for initial consideration. Among the up front problems are how to structure Army forces to fit this plan, if it is even feasible. Furthermore, DoD would need to standardize the services' deployment schedules. For example, today Navy and Marine forces spend approximately six months at sea, while the Air Force has opted for a three-month cycle for its AEFs. Another issue is how to divide resources that are not part of the basic schema, yet are essential to all operations, like combat support and combat service support assets. This is especially critical for what DoD calls high demand/low density assets like reconnaissance and battle management aircraft. Last, rotating the entire force through the experimentation process would undoubtedly raise the costs of experimentation, as more personnel would have to be trained on new equipment, in new operating concepts, etc.

Engage Brain Power

Experimentation leads logically to the second recommendation: *DoD should push the intangible, or soft power, side of military effectiveness.* Brain power enables sea, land, and aerospace power, and since war will remain an inherently human endeavor, the art of war will continue to matter more than the science of war. In this regard, slowing transformation may help orient the thinking of U.S. elites toward a top-down, strategic approach to looking at problems.[145]

29-31. Each pair of AEFs also has a mobility lead unit assigned. The Air Force plans to meld the two on-call AEFs into the ten rotational ones in the future.

[145] On the primacy of art over science, see Tilford, *Revolution*, 1, 6, 11, 17; Shelton, "Operationalizing," 103-4. U.S. Army analyst Steven Metz believes transformation will take a long-term commitment, putting Americans' oft-repeated affinity for military technology at cross-purposes to a second general trait of impatience. While the U.S. was able to sustain the Cold War arms race, the absence of a galvanizing threat in strategic forecasts diminishes the allure of expensive weapons, especially when the competition for available resources is high. Furthermore, as the discussion of institutional resistance indicated, the multiplicity of competing actors in U.S. defense planning works against the type of centralized planning that radical transformation would require. Getting all to rally behind a unified plan for transformation might prove excessively difficult. See Steven Metz, "Why Aren't Americans Better at Strategy?" *Military Review* 77:1 (January/February 1997): 187-90.

Education is crucial to this effort: With education, data can bloom into knowledge. The latest U.S. *National Security Strategy* touts the virtues of "regional expertise, language proficiency, and cross-cultural communications skills" for U.S. military members. Robust officer professional military education is especially vital. Williamson Murray has damned DoD on this subject, citing regression at the Air Force's Air University since an early 1990s upsurge in rigor, the Navy's reluctance to send its top officers to school despite having what he considers the world's greatest war college, and a National Defense University initiative to eliminate its civilian faculty and use the savings to buy computers.[146]

In fairness, all the services except the Navy now have advanced studies programs to develop cadres of officers with in-depth, master's-level education in policy, strategy, and operational art. Furthermore, the Navy runs a prestigious Postgraduate School, offering forty-seven degree programs (including sixteen doctoral areas and, notably, a Master of Arts in National Security Affairs). To boot, the National Defense University initiative went nowhere. Still, educational programs need to be challenging, instilling officers with the desire to continue their personal education after they leave school.[147]

Doctrine is a second crucial fruit of brain power. Unfortunately, effective joint doctrine can fall victim to service disagreements over doctrine's purpose and utility, compartmentalized development, or pressure to produce the "deliverable." Furthermore, while CJCS could

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[146] See *National Security Strategy*, 21 (quote). Also see M. Owens, 69. For Murray's views, see Murray, "Military Culture," 23, and Williamson Murray, "A Climate for Innovation," *Marine Corps Gazette* 82:1 (January 1998): 44-6.

[147] While the other services also offer graduate degrees, I believe the Naval Postgraduate School is unique in its centralized education for approximately 1,500 students, plus the fact that 99 percent of their faculty possess PhDs. See "Overview of the Naval Postgraduate School," updated 11 November 1998, <http://www.nps.navy.mil/overview.html> (cited 7 April 2000), paras. 3-5. For the Air Force equivalent, see "Factsheet: The Air Force Institute of Technology," updated 28 October 1999, <http://www.afit.af.mil/fsheet.htm> (cited 7 April 2000), paras. 3-7. For an excellent review of the current state of play, including discussion of advanced studies programs and provocative proposals, like making officers pass entrance exams for staff and war colleges, see Leonard D. Holder, Jr., and Williamson Murray, "Prospects for Military Education," *Joint Force Quarterly*, Spring 1998, 81-9.

technically decide all contentious issues—and these are manifold—it is obvious that if the lower

levels do not resolve the lion's share of disagreements, then CJCS's management task becomes

unbearable. As a result, the documents often end up as watered down or overly inclusive

compromises. If the parties cannot reach a compromise, then documents can be tied up in

perpetual coordination, sometimes over a word or phrase a particular service finds objectionable.

This argues for strong top-down guidance, perhaps in the form of a CJCS strategic plan tying

doctrine to strategy and operational plans. Doctrine development is another area where the U.S.

should consider involving key military partners, with the recognition that it would complicate the

already difficult coordination process.[148]

A third aspect of soft power relates to American culture. As mentioned above, the

system of systems' tendency to centralize control and execution of operations could stifle

individual initiative, an American strong suit. The Vietnam vision of stacked-up helicopters,

each holding a command echelon from battalion (lowest altitude) to corps (highest altitude), to

observe/direct a ground firefight took technological means to absurd ends.[149]

In an intriguing notion, U.S. Marine officer Arthur Corbett argues the next RMA will

have its roots in free markets and liberal ideals. The military manifestation is a *distribution* of

authority and *decentralization* of command and control to capitalize on inherent American

strengths. This is particularly salient as war becomes ever more chaotic and complex. In

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[148] For critiques, see Douglas C. Lovelace, Jr., and Thomas-Durell Young, "Joint Doctrine Development: Overcoming a Legacy," *Joint Force Quarterly*, Winter 1996-97, 94-100. For a saga of inter-service rivalry played out on the background of joint doctrine, the seven-year battle to get Joint Publication 3-01 (*Joint Doctrine for Countering Air and Missile Threats*, dated 19 October 1999) approved is hard to beat. See Elaine M. Grossman, "Airpower Gains in the Doctrine Wars," *Air Force* 83:3 (March 2000): 46-7. The need to accelerate combined doctrine was another ALLIED FORCE lesson learned. See *Kosovo/Operation Allied Force After-Action Report*, 28, 128.

[149] For the impact of the helicopter on operations in Vietnam, see Van Creveld, 255-6. In a manner those familiar with the quantum physical concept known as the Heisenberg Uncertainty Principle would understand, Van Creveld says high-level observations of ongoing actions "were frequently so powerful *as almost to paralyze the action* they were supposed to monitor" (emphasis added, p. 256).

Corbett's construct, technology in the form of advanced information and communication systems are important enablers, but the central requirement is trust on the part of U.S. leaders. Operating under mission-type orders, future warriors would practice a form of meta-*Auftragstaktik* to achieve their objectives.[150] While Corbett's presentation suffers from a lack of empirical evidence, along with a tactical-level focus on land warfare (he wrote the paper for the Army War College), with a little imagination its applicability could be expanded to include all types of military operations.

Leverage Technology

The third recommendation is *to leverage advanced technology to the maximum extent U.S. strategy allows.* In the end, a compromise approach will likely prevail. The Defense Science Board concluded current DoD modernization programs, if implemented fully, would "project a decades-long bow wave offering little or no headroom for major new initiatives."[151] It is a pretty sure thing DoD will recapitalize its force structure with the QDR's slate of programs, e.g., F-22, F/A-18E/F, V-22, etc., instead of radically new systems. However, we need to remember these programs are not exactly bows and arrows, Moore's Law aside, and will very likely keep the U.S. military in the world's lead for decades to come.

Hence, integrating advanced technologies into (or onto) service-preferred or legacy

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[150] See Corbett, cited above. George Gilder describes the effectiveness of technology-enhanced distribution of authority thus, "Rather than pushing decisions up through the hierarchy, the power of microelectronics pulls them remorselessly down to the individual. This is the law of the microcosm." See Gilder, 346. *Auftragstaktik* was a concept developed by the Prussian General Staff in the wake of their defeat by Napoleon. Prussian/German forces used it to great effect for much of the 19th and 20th centuries, at least at the tactical and operational levels. According to one recent article, the idea "subsumes all the following concepts: individual initiative, independent decision making, and thinking leaders reaching tactical decisions on their own accord. In short, a commander would specify to subordinates *what* to do, not *how* to do it." See David M. Keithly and Stephen P. Ferris, "*Auftragstaktik*, or Directive Control, in Joint and Combined Operations," *Parameters* 29:3 (Autumn 1999): 118-33 [emphasis in original].

[151] *Report of the Defense Science Board*, 22.

systems like manned aircraft, aircraft carriers, submarines, and mechanized vehicles, though

perhaps not an optimal solution, may be an effective and achievable one. On a more positive

note, building "plug and play" capability into new systems would permit quick performance

upgrades. Finally, as the Defense Science Board also points out, the U.S. can have an RMA

using both new and legacy systems.[152] This drives back to brainpower and doctrine.

In the hedged transformation schema, basic scientific research, as well as broader R&D,

will be extremely important. Specific interest areas are numerous, but include materials,

biotechnology, miniaturization, optics, physics, propulsion, directed energy, and, of course,

information. As Stephen Peter Rosen points out, military R&D is often conducted quite

effectively "in an environment of uncertainty about enemy capabilities, the costs of new

technologies, and the benefits of new technologies."[153]

The basic research of today will be the operational system of 2020. Emerging Air Force

programs tell the story. The Airborne Laser started as a basic research project in 1976 and will

become operational in 2007. Technologies from the 1970s enable the Space-Based Infrared

System, whose first element will reach initial operational capability in 2003. The F-22,

scheduled for 2005 operational deployment, is noted for its aggregation of advanced materials,

avionics, and propulsion technologies, most of which began life as research in the 1980s.[154]

However, the R&D funding picture is troubling. After peaking at 14.4 percent of DoD's

total budget authority in fiscal year 1998, R&D has dropped steadily, to where it is only forecast

at 11.5 percent of budget authority by fiscal year 2005. The U.S. Air Force, long recognized as a

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[152] The board cited *blitzkrieg* as an example of such a hybrid revolution. See *Report of the Defense Science Board*, 22. Also see Conley, 67, and Conetta and Knight, 37-8.

[153] Rosen, *Winning*, 52 (quote), 221-50, 260-1.

[154] Air Force Association (AFA) Science and Technology Committee, *Shortchanging the Future: Air Force Research and Development Demands Investment*, AFA Special Report (Arlington, VA: Air Force Association, 2000), 3-8, 11, 21, 27. For a synopsis of recent efforts in science and technology, see W. Cohen, *Annual Report*, 132.

technology leader within DoD, slashed science and technology funding from $1.77 billion in fiscal year 1990 to a projected $1.183 billion in fiscal year 2000 (in constant fiscal year 2000 dollars), a decline of 33 percent.[155]

Further, the combination of smaller U.S. defense budgets and industry consolidation has taken much of the "defense" out of the defense industrial base, both absolutely and relatively. For example, DoD's portion of annual sales in the aerospace industry declined from 53 percent to 29 percent between 1988-1999. With less business coming from DoD, industries are reluctant to invest in R&D for initiatives with little or no commercial potential. Hence, DoD may have to foot more of the R&D bill. It may also have to invest in technologies that have little apparent military utility, at least at first blush, if they have important industrial base implications. Still, DoD's focus should be on developing items it can readily operationalize if necessary, using "build-to-shelve" prototyping where it makes sense. For the latter, DoD must ensure it purchases prototypes in large enough numbers to allow robust testing and tactical development.[156]

R&D should involve the tried and true as well as the new and innovative. Brookings Institution scholar Michael O'Hanlon argues that while a revolution is ongoing in areas like microelectronics, it is less apparent in other important military technologies, like those enhancing logistics. While less sexy than the system of systems, specific initiatives for all services include lighter—but still potent and protective—military vehicles, along with advanced propulsion systems, mine resistance, shallow water capability, short/unimproved airfield capability, fuel

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[155] For S&T and R&D trends, see Office of Management and Budget, *Historical Tables, Budget of the United States Government, Fiscal Year 2001* (Washington, DC: GPO, 2000), 76-8 (Table 5.1, Budget Authority by Function and Subfunction: 1976–2005) and AFA Science and Technology Committee, 2-4.

[156] AFA Science and Technology Committee, 2-8, 11, 15-26. The AFA report was critical of the Air Force's commitment to R&D, running afoul of the service leadership for getting ahead of the service's intended advocacy for increased funding. See Stanley W. Kandebo, "USAF, AFA at Odds Over R&D Funding," *Aviation Week & Space Technology*, 24 January 2000, 26-7. For prototyping strategies, see Conetta and Knight, 37; Rosen, *Winning*, 243-50, 259-60; and Vazquez (cited above).

efficiency, and enhanced lethality and precision of all munitions classes.[157]

Build a Twenty-first Century Bureaucracy

What I have been describing above asks for significant flexibility from an inherently unmanageable structure. Hence, the fourth and last recommendation is for *DoD to fix what it can internally and live with what it cannot fix.*

A less than fully rationalized approach to defense may be the price the U.S. has to pay for being a democracy. To recap, under the U.S. system, the executive and legislative branches share civilian control of the military. Likewise, within the defense establishment, various fiefdoms share power in a highly competitive, mostly transparent, and largely democratic fashion. U.S. law mandates one set of actors, the military departments (services), to organize, train, and equip forces that are then assigned or allocated to a second set of actors, the combatant commands, for employment. Third and fourth sets of actors include SecDef and CJCS, each with powerful staffs, who exercise unified control and direction. In bureaucratic political fashion, each operates fairly autonomously most of the time, but are forced into interdependence at key points in the requirements and budgetary processes, as well as during operations.[158] While inelegant, even downright ugly, this approach is also consistent with American values at its core.

Still, the U.S. cannot afford unnecessary inefficiencies, especially when following a hedging approach. If the need for transformation or any other radical reconfiguration of military forces becomes self-evident in the future, the U.S. needs to be able to respond coherently and

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[157] Logistics is where General Shinseki is focusing current Army efforts because of its applicability to all military tasks. See O'Hanlon, "Military Technology," 70; O'Hanlon, "Implications," para. 4 under "Airpower in Future Wars" and paras. 4-8 under "Technologies That We Should Buy—And Soon."

[158] For statutory responsibilities of the various players, see 10 USCS 113, 131,153, 155, 162, 163, 164, 3062, 5062, 5063, and 8062 (1999), text from: *United States Code Service*, available from: *Congressional Universe* (Online Service), Bethesda, MD: Congressional Information Service. See also Conley, 62.

rapidly.[159]

Who would drive a rapid transformation? Two notable studies of the subject reached

different conclusions. Harvard Professor Stephen Peter Rosen, in *Winning the Next War:*

Innovation and the Modern Military, argues that the military itself has historically driven most

military innovation. This has been especially true in peacetime, though it has held during

wartime and with the introduction of new technologies, albeit to a lesser degree. Conversely,

Massachusetts Institute of Technology Professor Barry R. Posen, in *The Sources of Military*

Doctrine: France, Britain, and Germany Between the World Wars, argues that civilian

intervention has been the catalyst for innovation, overcoming obstacles inertia-bound military

hierarchies threw up.[160]

However, the two arguments do not have to be mutually exclusive. There is a way to tie

them together. If you ascribe to Rosen's belief that innovation is largely the military's game,

then the services might function best as parochial players generating competitive ideas.

Continuing the sports metaphor, in this case perhaps what the U.S. would need is not a better

ballgame, but stronger umpires. Thus, as in Posen's analysis, civilian leaders would declare the

winners and losers. As discussed earlier, this did not happen on any grand scale in the 1990s.

All the services have downsized relatively proportionately, except for the Marines, who were

able to hold on to more of their force structure.[161]

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[159] Rosen, *Winning*, 260-1
[160] Rosen's work is cited above. Rosen asserts peacetime innovations tend to be most profound. Also see Barry R. Posen, *The Sources of Military Doctrine: France, Britain, and Germany Between the World Wars* (Ithaca, NY: Cornell Univ. Press, 1984). I have met both authors who, in addition to having rhyming surnames, are also accomplished experts in military affairs. Both books are well argued and supported, though as a career military officer, I find Rosen's analysis rings somewhat truer, and is more nuanced as well. The only thing I find awkward is his disaggregation of innovation into the taxonomy of peacetime, wartime, and technological. As a final point, eminent military historian Sir Michael Howard, in a talk transcribed in the March 1974 *RUSI Journal*, came down on both sides of this issue. See Howard, 7.
[161] *Report of the Defense Science Board*, 18, 22, 25-6; NDP, "Assessment," para. 6 under "Principal Observations & Recommendations."

Such even-handedness has not always prevailed in U.S. defense management. A case in point was SecDef Louis Johnson's 1949 choice of the Air Force's B-36 bomber over the Navy's *USS United States* supercarrier as a centerpiece of U.S. national security. Whatever one thinks of Johnson or the resultant "revolt of the admirals," the fact remains this was a decisive move that set the pattern for defense policy and spending throughout the 1950s. The post-revolt fallout also revealed the presence of strong Congressional leaders, like Carl Vinson, who were highly knowledgeable in defense issues. In a good example of hedging at work, Representative Vinson helped the Navy recast and sustain its carrier air power at a time when it could just as easily have been tossed aside by a parsimonious defense department seeking the most "bang for the buck."[162]

In searching for Posen's type of informed and resolute civilian leadership, the U.S. may find the going tough. According to a recent high-level assessment: "Discriminating and hard choices will be required."[163] Okay, but who will make them? Congress is too diffuse and structurally focused for the job. The Commander-in-Chief of Joint Forces Command can be an honest broker, helping identify what Admiral Harold W. Gehman, Jr. (the current occupant of the position) calls the "unmet military challenges," along with promising initiatives. However, this position possesses neither the statutory charter nor the inside-the-Beltway clout to drive major changes. The experience of Admiral Owens indicates even the VCJCS may not be a powerful enough agent for change. Admiral Gehman goes further: "Whether the top cover and support of even the Secretary of Defense and the Chairman of the Joint Chiefs of Staff is enough to overcome the immense cultural inertia of the Department of Defense is unclear to me."[164]

To the Defense Science Board, "transformation is clearly a CEO's game" (contrast this

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[162] For a detailed description of this fascinating and volatile time in DoD's "youth," see Jeffrey G. Barlow, *Revolt of the Admirals: The Fight for Naval Aviation, 1945-1950* (1994; rpt. Washington, DC: Brassey's, 1998). Barlow, whose father was a naval aviator, wrote this book under the auspices of the Naval Historical Center, so it is somewhat biased toward the Navy perspective, yet is very detailed and well researched.

with Rosen's thesis above), but what if Admiral Gehman is right about the CEOs of DoD? SecDef and CJCS, while hugely influential, also have enormous day-to-day responsibilities that force them to focus on the near term. Independent or quasi-independent "blue ribbon panels" (Commission on Roles and Missions, Packard Commission, National Defense Panel, U.S. Commission on National Security/21st Century, etc.) have had mixed records in realizing consequential change. Perhaps what is needed is to involve the President and key Congressional leaders more directly in setting the agenda for national security, as in the Defense Science Board's idea of cultivating a Congressional "transformation caucus."[165]

We also need to remember the U.S. spent $11.5 trillion (in 1992 dollars) from 1950-1992 to build its Cold War-winning juggernaut and "the political, institutional, conceptual, and emotional commitment supporting this investment were correspondingly strong, providing a primary organizing purpose for the entire U.S. political system."[166] It is unrealistic to expect this web of commitments to dissolve quickly. It has proved resistant to radical change.

Finally, and I will only touch on this, the U.S. desperately needs requirements, budgeting, and acquisition processes that come close to keeping pace with technological change, or at least allow the freedom of action to capitalize on promising innovations. "Everybody" knows PPBS is anachronistic and hopelessly inefficient, yet "nobody" has been able to break DoD free of its clutches. Since Congress is also conditioned to move to its rhythms, change would be very tough to effect.

As an interim compromise, DoD should pursue measures to increase its budget

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[163] The United States Commission on National Security/21st Century, 7.

[164] Gehman, 8 (first quote), 9, 10 (second quote).

[165] The DSB report cited herein covers this issue in a little more depth. It describes initiatives led by the services, (then) U.S. Atlantic Command, and OSD, along with a new Joint Vision Integration Cell resident within the Joint Staff. A problem is many of the central activities and assessments have been delegated to second- and third-echelon organizations within DoD. See *Report of the Defense Science Board*, 9, 19, 21-3, 27-8, 30. Also see Conley, 67-9; E. Cohen, A18; and Shelton, "Operationalizing," 106.

flexibility. One idea it is considering would set aside an annual pot of money for promising

initiatives emerging from experimentation. Since 1996, the Army has modeled this with its

Warfighting Rapid Acquisition Program (WRAP). WRAP gives successful experiments

acquisition priority, avoiding the "back of the queue" syndrome. The Marines and the Air Force

intend to start similar programs in fiscal years 2001 and 2002, respectively. However, WRAP is

a relatively small dollar program at around $100 million annually. Consider the implications if

DoD's overall total was closer to the NDP's $5-10 billion wedge. A complementary measure

would provide a feedback loop from experimentation to the acquisition process and PPBS. To

Admiral Gehman, the absence of such a loop today is the greatest failing in DoD's

transformation efforts.[167]

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[166] Carter, Perry, and Steinbrunner, 2.

[167] See *Report of the Defense Science Board*, 8, 11, 17, 26. The Army started WRAP to provide fast track funding for successful products of its *Force XXI* initiative. See W. Cohen, *Annual Report*, 130, and "U.S. Army News Release 96-61: Warfighting Rapid Acquisition Program," dated 28 August 1996, <http://www.dtic.mil/armylink/news/Sep1996/r19960913wrap.html> (cited 8 April 2000), paras. 3-4. Also see Gehman, 11.

CONCLUSION

The Gulf War opened the eyes of the world to a new way of warfare, a seemingly American way, where advanced technology could paralyze an enemy quickly, cleanly, and completely, with low risk to friendly forces. If stealth, precision, and information were the holy trinity of hyperwar, then the computer chip was its central icon. Were we at "The End of History?" as analyst Francis Fukuyama asked, with an opportunity to bury history's handmaiden, violent conflict, as well?[168] It seemed too good to be true. It was.

Transformers have urged DoD to trade current force structure for investment in C4ISR assets and the necessary technologies to create a system of systems. They have also questioned the applicability of DoD's modernization game plan. When the fiscal environment began to reduce the pressure for tradeoffs, and the realities of operational commitments and DoD's desire to hedge both became apparent, transformers turned instead to proposals to set aside portions of the force for experimentation.

Another alternative for the U.S. would be to base its force structure on the types of missions it has been called upon repeatedly to perform since the Gulf War. Here, the U.S. would forego significant modernization or transformation to invest in manpower and the resources to conduct peace operations, humanitarian relief, and other comparable missions. However, since warfighting remains the primary reason the U.S. has armed forces, and reversing the flow of technology would be tantamount to "putting toothpaste back into the tube" (or comparable cliché), this option is non-viable. Thus, the U.S. has elected a middle, hedging approach.

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[168] Fukuyama's article has become famous, but concerned itself with the Marxist-Leninist ideological conflict with Western liberalism. He allowed for the continuance of violent conflict elsewhere in the rest of the world still mired in "history" (as it has panned out). See Francis Fukuyama, "The End of History?" *The National Interest* 16 (Summer 1989): 3-18.

During the 1990s DoD drew a bead on two diametrically opposed targets: downsizing, and keeping pace with an unprecedented pull on its resources. The services also resisted transformation in favor of their own priorities for readiness and modernization, while other actors, like Congress, were inconsistent or ambivalent. In the middle of the decade, Admiral William Owens burst on the scene with transformational zeal, but his efforts seemed to have flamed out, leaving mostly scorched bureaucratic earth in their wake. Since his retirement, he has managed to keep the flame alive, but only barely.

JV 2010 also embraced the RMA, but its concepts are too elastic to define a discrete course of action. After the QDR's conservative report, the NDP again took up the cause of transformation, but SecDef disputed their idea of accepting near-term risk for potential long-term gain. As for ALLIED FORCE, experts and policy makers are still digesting and widely debating its effects.

Uncertainty about the future makes defense planning problematic. The only things we are pretty sure of are that the next few decades will be quite violent, and the risk of a global competitor emerging to challenge the U.S. will remain low. Transformers argue the U.S. still has a technological lead—though it is diminishing daily—and needs to act now to stay ahead. The commercial market offers opportunities for potential competitors to compete with the U.S. in various ways. Still, when navigating in the dark, the U.S. might want to avoid making major course changes.

Since forecasting is not definitive, I next looked at technology's effects on U.S. foreign policy. Here, as ALLIED FORCE perhaps foreshadowed, a capability gap between the U.S. and its allies could reduce U.S. ability to forge effective military partnerships in the future. Ultimately, this could paralyze U.S. foreign policy and reduce its global influence. While the

U.S. could and should share the fruits of information superiority with its military partners, as transformers argue, it needs to have partners to share with in the first place. Inhibitors include interoperability, uneven burden sharing, perceptions of differential risk, and command and control processes that negate the operational advantages of assets such as a system of systems. Failure to address these problems resolutely could drive the U.S. to the Hobson's choice of unilateralism or inaction as policy options.

The U.S. has a way out of this conundrum, albeit a difficult way. If it can agree with key military partners like Britain, France, and Germany on the general path transformation should take, the issue then becomes one of synchronizing the pace of change, as well as funding the requisite systems (with the latter likely to be the more difficult problem to solve). In determining what partners it needs to engage, the U.S. should use as a primary criterion those with whom it would likely conduct robust offensive strikes.

While the U.S. could work to make transformation fit its foreign policy, or vice versa, the future nature of conflict dictates the U.S. should hedge and approach change in an evolutionary way. Transformers argue technology can be a force for stability in international relations, delivering cleaner and quicker outcomes, with positive effects before, during, and after conflicts. In reality, high-tech forces could actually make conflict more likely due to their perceived omniscience and ability to deliver discriminatory effects. Self-perceived omniscience could make preemption a more attractive option for the side possessing information superiority. For the same reason, overmatched adversaries might be tempted to strike first in pursuit of quick and demoralizing effects, specifically against the Achilles' heel of U.S. political will. Similarly, the existence of seemingly more discriminate weaponry may actually lower the threshold for decisions to resort to organized violence.

Another series of reservations concerns the likelihood that any technological or doctrinal innovation can engineer friction and fog out of warfare. In some ways, the system of systems, if indeed technically possible in the first place, might in fact increase complexity by providing staggering volumes of data to all levels of command and control. This will drive centralization and increase the number of actors in the "decision-action" half of the OODA loop, slowing the response process, as the U.S. has experienced in modern conflicts.

Transformers sometimes fail to consider the effects U.S. technology would have on the adversary, who are not inert objects, but highly adaptive and reactive people. They will not appreciate the finer points of precision warfare, and might prefer to raise the stakes by resorting to first use of terror weapons or other "dirty" tactics. They know U.S. vulnerabilities and will counter U.S. strengths using deception, concealment, and information operations to their advantage, along with capabilities they buy in the ever-growing global market.

Uncertainty also argues for the U.S. to continue its robust military engagement. If you do not know what is coming, it is best to be out in the world trying to find out. For one, physical presence provides the best source of assessment, "eyes on." Second, it allows the U.S. to shape the international environment proactively. Third, when facing a developing contingency, it is almost always quicker and more effective for the U.S. to respond initially with forward deployed or stationed forces than to deploy forces from home.

Transformers envision a lighter, leaner, and meaner military delivering massed effects without massed forces. While optimized for the high end of responding, this could put a tremendous strain on a force used primarily for shaping, or the low end of responding, as there would be fewer forces having to go more places with less spin-up time.[169]

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[169] By "high end" I mean combat primarily, e.g., MTWs, and by "low end" I mean things like peacekeeping, humanitarian relief operations, etc.

This whole discussion may be moot, however, as world events may not allow the U.S. the necessary respite to transform its military. If the U.S. pulls back to allow transformation anyway, it may find it tougher to get back into the game than it was to leave it.

So what should the U.S. do? As former CJCS General John Shalikashvili noted, "Implementing the RMA will require a sustained effort, a process of balanced *evolution* toward revolutionary capabilities."[170] Thus, I believe DoD's current course, with minor trim inputs, is correct for turbulent air (or seas). This assumes Congress and the American people will not want to pay for readiness, recapitalization, modernization, *and* whatever other elements a system of systems would require. In the unlikely case that this assumption is false and the U.S. could buy all of the above, it might want to do so, provided the U.S. leadership understands the limitations and pitfalls I have noted.

If the resource assumption holds, however, there are a number of things DoD should do to improve its position in case the strategic picture becomes clearer and more threatening. Joint experimentation has a lot of systemic support, but should include key military partners as much as possible, to the point where the U.S. may want to do an important share of its experimentation in Europe. It should also push ideas and forces to failure, with failure perhaps becoming something of a badge of honor in this arena.

The U.S. may want to field test a system of systems in the Western Hemisphere drug war. This would provide the benefits of testing the technical feasibility in an environment featuring great geographic size and diversity, along with a cunning adversary. The best part of such a test is it will probably help the existing mission without facing the risks of combat failure.

DoD also needs to put a premium on brain power. Proposals in this paper include

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[170] Comments by the Chairman of the Joint Chiefs of Staff (independent assessment mandated by law) in W. Cohen, *Report of the QDR*, 67 [emphasis added].

enhancing education, creating more powerful joint and combined doctrine, and leveraging initiative, an American cultural strength, to maximum operational utility.

The U.S. should ensure its new systems use advanced technologies and are as easy as possible to upgrade. It also needs to put more money into R&D, working closely with industry and key military partners on both exotic and mundane initiatives. According to Andrew Marshall, different circumstances yield different technological solutions: perhaps "there is no one RMA."[171]

Finally, with flexibility at a premium, DoD needs to harness potential pathologies like interservice rivalry for the useful purpose of generating competing ideas. It also needs modern processes for funding and acquiring successful products of the experimentation and R&D processes. To do all this, the U.S. needs strong, engaged civilian leadership in both the executive and legislative branches to arbitrate among competing interests.

At bottom, war is not an optimization problem, a system of linear equations just waiting for the right algorithm to come along. It is, and will remain, a decidedly human endeavor, full of uncertainty and complexity in all their meanings. This should have been a central lesson of the U.S. experience in Vietnam and of other operations like the World War II strategic bombing campaigns.[172] A formulaic approach to warfare has its greatest utility at the tactical level, where details of how much and whose forces to use against which targets to achieve what type of effects are most important. It becomes increasingly less useful as one moves up the levels of warfare, and has virtually no applicability at the policy level, the province of art, not science. Technological virtuosity will never compensate for inept strategy or policy.

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[171] Quoted in Sherman, "Looking Forward," 20.
[172] M. Owens, 63-70; Clausewitz, 141. Clausewitz advises the budding theorist to make use of principles and rules, "but never to construct an algebraic formula for use on the battlefield." "Victory through statistics" was one of the more reviled and well-documented follies of Vietnam. For a pithy recap, see Van Creveld, 239-41, 252-5, 259.

In closing, DoD would be wise to avoid becoming the butt of the old bad news/good news joke, where the bad news is it's lost, but the good news is it's making great time. In an uncertain and dangerous world, a better admonition is: "Keep your powder dry!"